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The IRON AGE

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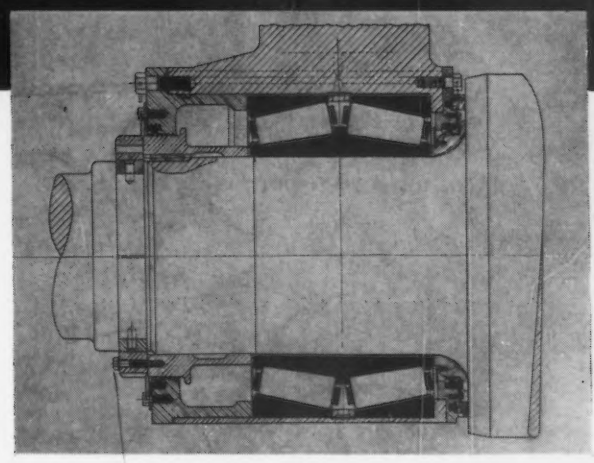

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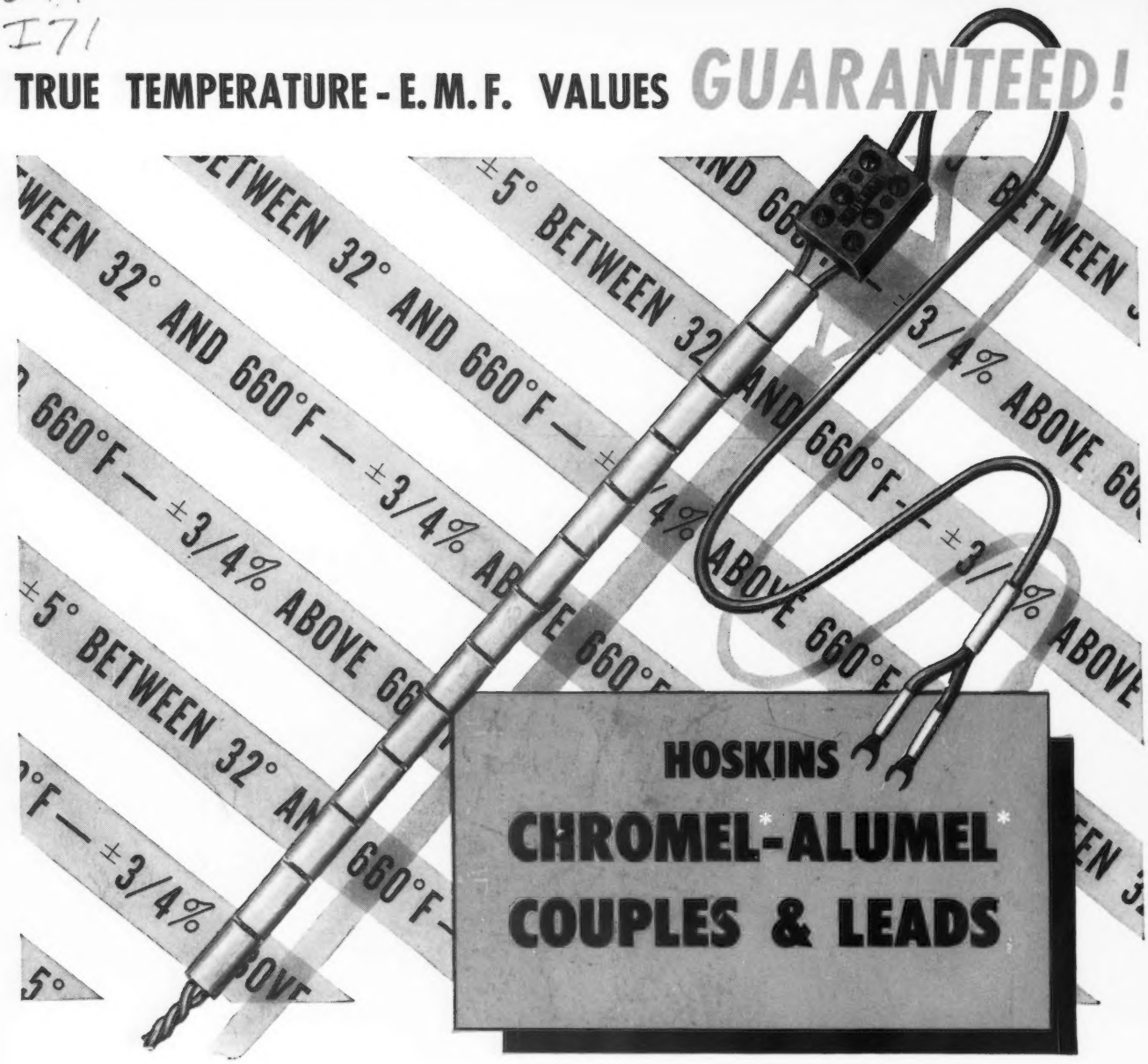

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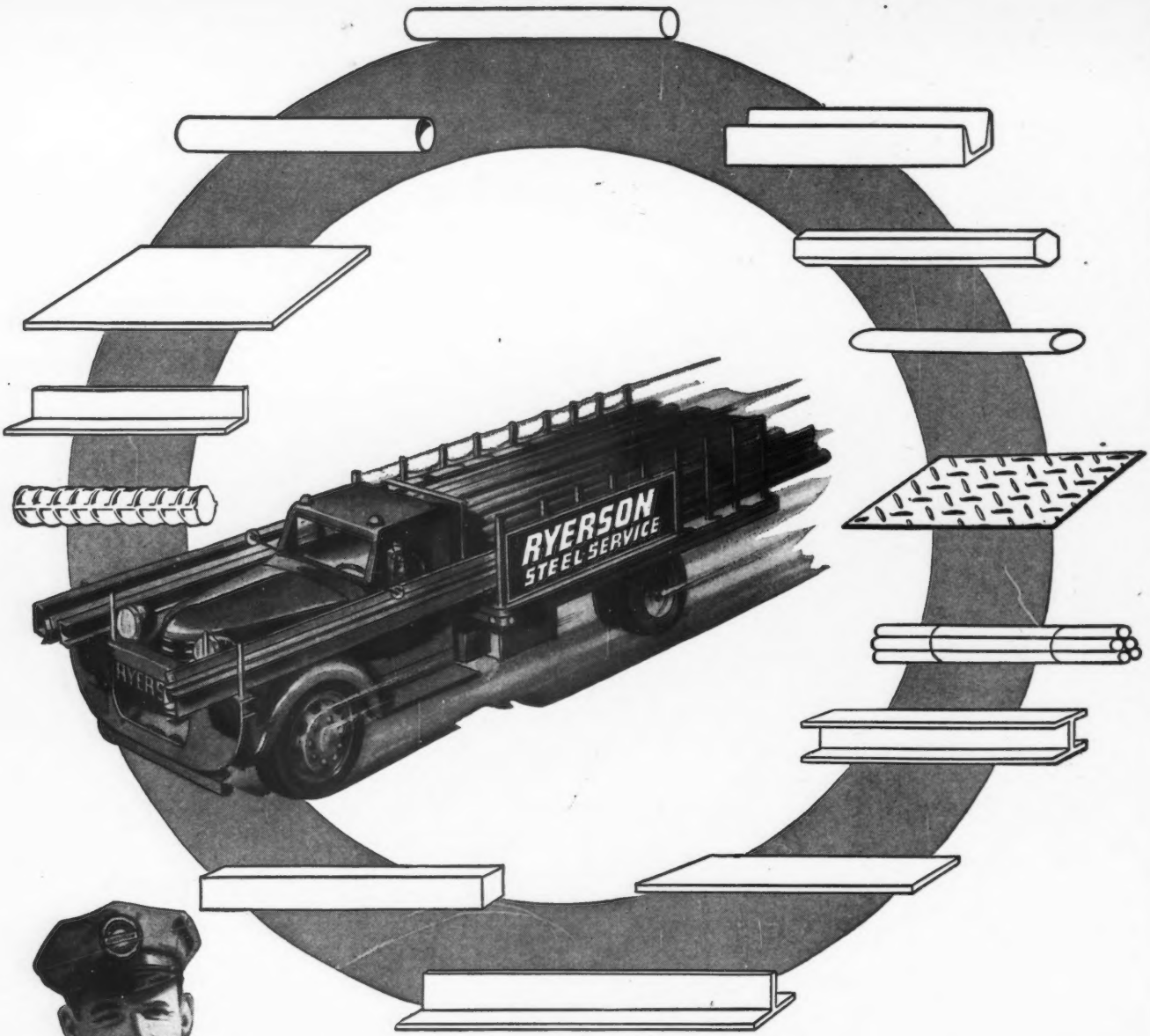

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For Want of a Spring

MR. HERBERT EFFINGHAM III, small businessman and rugged individualist, has shown of late certain traces of strain. He's taking to muttering to himself and snapping at the help. There he is, knee-deep in a sellers' market, lush profitable orders fighting for space on his books, his warehouse bulging with materials, his labor temporarily cowed, no OPA, and only eight or ten government forms to fill out weekly.

There he is—rolling in profits, damn near broke.

Effingham makes tubular metal furniture—an established line of high repute. War's end found him with a modern plant, no debt, and a bank balance as comfortable as the revenuers would permit. He was smart, a real go-getter, an avid reader of miscellaneous dope sheets and four expensive confidential mimeographed weekly newsletters. He was the spearhead of the first assault wave on available raw materials.

Burlap, webbing, cotton ticking and Kapok were rather easy in the early confusion. Four full carloads at a not half-bad price—a little on the black market side, but still not half-bad what with prices blowing their tops every fortnight. Artificial leather and weatherproof fabrics took quite a bit of doing. Almost a week in New York, entertaining and such, along with some rather odd financial arrangements. But the six carloads of material stacked in the warehouse was a consoling sight. Never mind the tie-in sale of remnants—they'd make wiping cloths for the next 10 years or so. The paints, enamels, cleaners and chrome-plating chemicals were a pretty rugged scramble. Johnson, the banker, came through with a commercial loan for the last couple of deals—over the phone it was, quick as a whistle.

Effingham was getting smarter all the time. The matter of metal tubing was his most spectacular coup. Seems like most people had not yet figured out the angles to war surplus, or maybe they were stymied by the paper work and forms in triplicate. A whole warehouse full of airplane tubing it was—a lot of it good for nothing but airplanes—but it had to be the whole shebang or nothing. The matter of renting additional storage space took some time, and Johnson, the banker, started to get kind of stuffy. Effingham had to hang around the bank quite a while, but he picked up a couple of good jokes from all the other Chamber of Commerce fellows who were lined up waiting for Johnson. Good thing all his papers were in order for even so the whole thing chewed up a couple of hours what with all the advice, signing, witnessing and the like.

The boys out at the plant have been stacking frames up to the ceiling, although individual productivity of late seemed to be falling off. None of the frames can be upholstered. Springs have been only just trickling through. Effingham is on the phone half the time—even goes around to see all the spring-makers. They all seem to talk like Gromyko—yes, yes, but no, no, or maybe. But, dammit, he'd make his own springs, or try to. One machine-maker took his order—for 1950 delivery. The girl in the office of the spring wire plant kept chewing her gum and straightening her seams all the time he was inquiring about delivery promises.

Effingham is getting hot. He'd even write a letter if he could decide whose hide to take off. He can't even blame things on the British any more. His wife, a right smart girl, has even figured out a classy ending for the letter: something like—For want of springs the cushions are lost, for want of cushions the metal furniture is lost, for want of metal furniture, Effingham III is lost.

T. W. Lippert

I'm your metallurgist

Yes . . . and almost 200 more at Inland are your metallurgists. You have probably only met a few of us . . . those who go into the field and work directly with application problems on the job. Most of us work in the Inland Mills and Metallurgical Laboratories.

Some work on control of the quality of the heats being produced for today's orders. Others are working on research and development . . . for the steels of tomorrow. (Progress is the reward of applied hard work). Yesterday steel met the simple requirements of old-time methods . . . today it meets the high-speed, mass-production requirements of modern industry . . . tomorrow it will be still better—will fill new needs.

The demand for steel today, unfortunately, is greater than capacity production so you cannot get all the steel you want. However, Inland metallurgists continue to serve as your metallurgists. So, whenever you have a problem of application or fabrication, please call on me . . . I'm your metallurgist—and at your service.

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► The Federal Trade Commission, which has been giving special attention to a study of steel marketing since the first of the year has now turned its glasses on steel company competition with non integrated fabricators and what it alleges are changes in the mill practices of the industry which diverge materially from the prewar pattern of supply.

► So much pressure has been put on getting pig iron for soil pipe producers that pressure pipe makers are getting annoyed and housing experts are predicting the latter may be a bigger bottleneck than is now assumed.

► The automobile industry is missing few opportunities to slash costs. For example, an axle plant standardized on one of three kinds of axle pins for different types of front axles, eliminating the selection problem and saving ½¢ per axle. The time saving means $5000 on a million axles.

► Tool steel manufacturers, who reverted to an old practice of allowing customers to cover prior to this week's price increase, have been booking new business out of all proportion to what was anticipated. Some large buyers had some success in pressuring producers into deliveries but few of the smaller consumers received major increases in inventories.

► One prediction heard in Detroit is that if the price of aluminum should drop to 10¢ per lb it would be used for hoods, door panels, rear deck lids, wheels, and possibly engine blocks and heads.

► In considering British pressure for steel mill reparations from Germany it should not be forgotten that the British steel industry has a long term desire to import semifinished steel from Germany.

► In new labor legislation shaping up, Washington sources are confident there'll be a ban on mass picketing and a requirement that strikes be called only after a majority vote by secret ballot. There will probably be no ban on industry-wide bargaining unless both sides want it and no anti-trust law is violated.

► Despite ballyhoo about the Geneva trade conference, few actual official details of specific agreements will be forthcoming from the meeting. All such agreements or concessions will be kept confidential until approved by the President and heads of signatory nations.

► An inert paint, easily applicable to metals, has been developed to withstand temperatures up to 2400° F. The new material will prevent deoxidation and recarburization. It can be used on metals heated to high temperatures as a protection against scaling.

► Spectrographic analysis has been put to interesting uses by International Nickel which has developed special techniques for identification of occlusions and surface foreign material. Also, high frequency ignited arc discharges, time controlled, are used for the analysis of thin wires and strip.

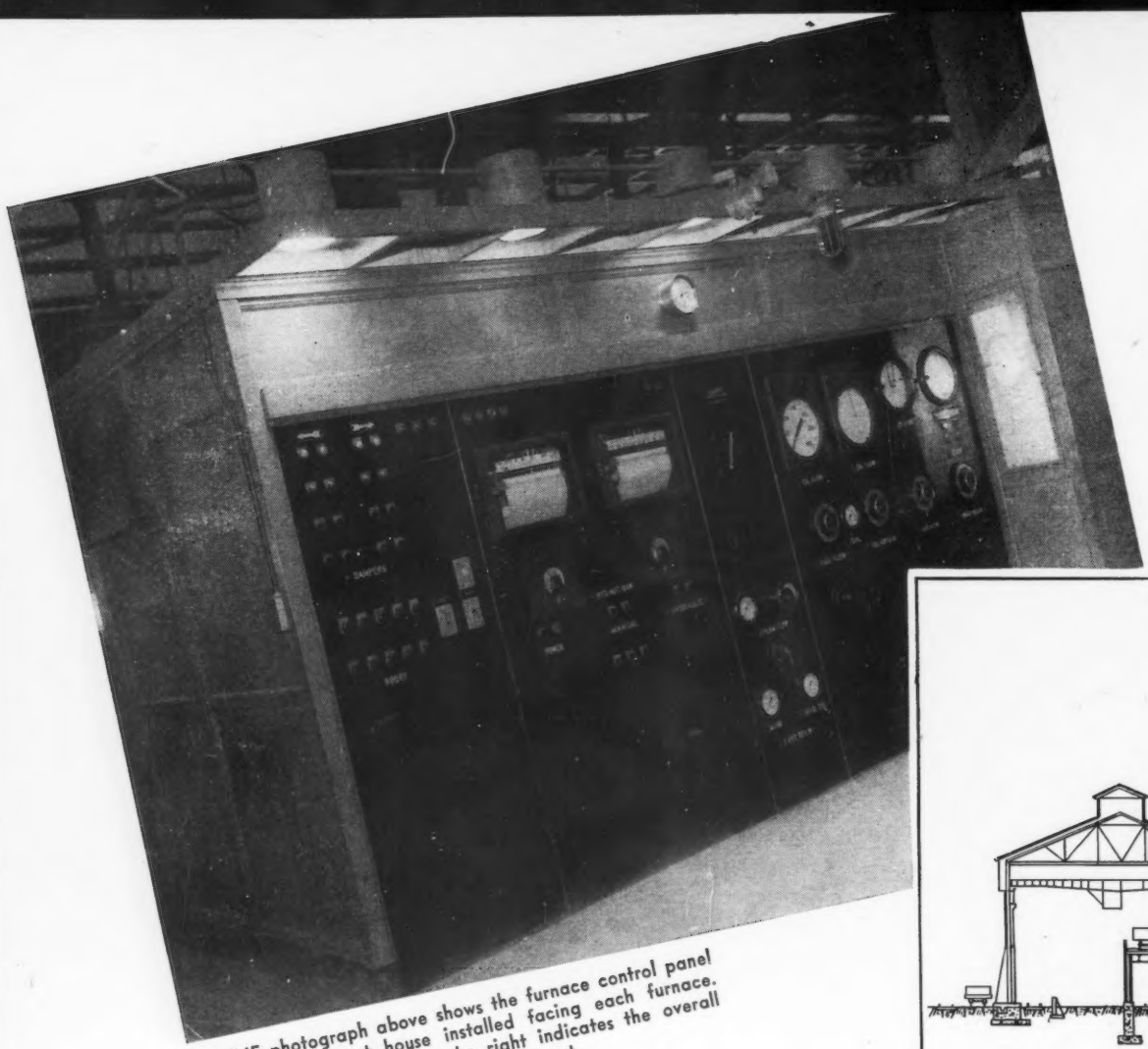
► Among the leaders in the nationalist movement in the Netherlands East Indies are one Dutchman and several Indonesians who have received special training in Moscow.

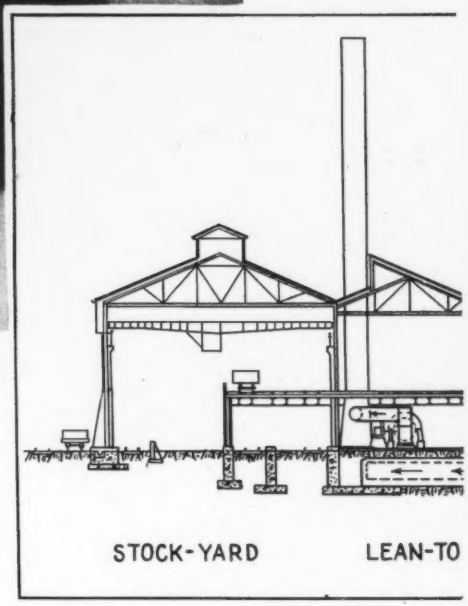
► An auto body plant is saving $5000 a month and keeping its patterns for re-use by melting Wood's metal off wooden patterns in a furnace built of discarded material. Formerly the metal (which now sells at $1.25 per lb) was unceremoniously chopped off, ruining the pattern and leaving a third of the metal in the anchor holes in the wood.

► A large industrial gas user in the Pittsburgh district has a simple technique to beat the natural gas shortages which crop up periodically during the winter. A liquid propane unit is kept in standby and when the gas company warns of a cut, propane gas, suitably mixed, is valved into the plant line. Gas users in the shop don't even know the difference.

► Metal fabricators who may be hoping for less competition from plastics now that war born substitutions are on the decline would be well advised to revise their thinking. Output of molding powder, now at four times the prewar rate, is slated for a further increase of 30 pct this year.

New Ho





THE photograph above shows the furnace control panel and instrument house installed facing each furnace. The schematic sketch to the right indicates the overall steelmaking yard layout.

Considered as being one of the most fully automatic installations of its kind in the world, the new openhearth plant at the Homestead Works of Carnegie-Illinois Steel Corp. has established noteworthy achievements in setting new production records, with a decrease in unit fuel costs. A description of the outstanding automatic features is presented together with details of furnace construction and plant layout.

ONE of the outstanding openhearth installations made during the war was that in connection with the Homestead Works of Carnegie-Illinois Steel Corp. Fortunately, when it was decided to increase steelmaking facilities at this plant, no time was lost in the development of a suitable furnace design. This was already in existence, for before the war, engineers and operating men from the various steel producing subsidiaries of U. S. Steel Corp. had agreed upon a new basic openhearth furnace design which would include the most modern construction and instrumentation and lend itself most readily to efficient operation. Eleven of these furnaces, each rated at 225 tons, were therefore erected in the new openhearth plant, the layout, including all accessory equipment, being equally modern and efficient. The nominal rated capacity of the plant is 1,700,000 tons a year, and many consider the furnaces as being the most nearly fully automatic in the world.

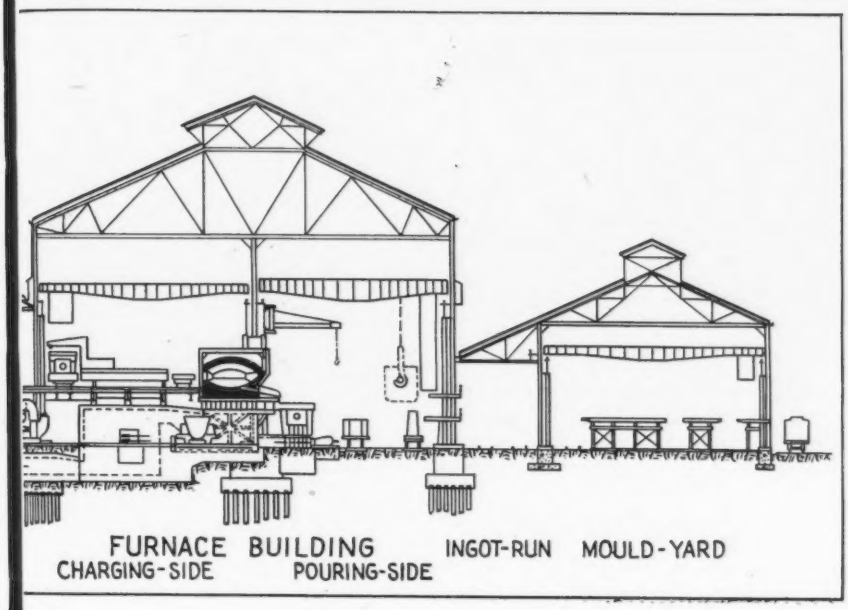
That these furnaces have lived up to the expectations of their designers is well demonstrated by the series of records which have been established by "O.H. No. 5."

During the first full year of operation, with an average of 9.2 furnaces in operation, 1,295,854 net tons of ingots were produced. In 1946 an average of 9.4 furnaces were in operation and 1,421,465 net tons of ingots were produced. In March of 1945 10.8 furnaces produced 147,180 net tons of steel, but by March 1946 that record had been broken, for with 10.9 furnaces in operation 152,607 tons of steel were produced. The maximum day's production of the shop stands at present at 6100 net tons.

Achieving those records has also brought about fuel economy records, for the present yearly average of fuel consumed per ton of steel produced is 3,260,000 net tons Btu per net ton of steel, with a record for one month's operation of 2,910,000 net Btu per net ton of steel, using Bunker C fuel oil having an average fuel value of 150,000 Btu per gal. Approxi-

Homestead Openhearths

Feature Highly Automatic Control



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By ROBERT URQUHART
Asst. General Superintendent,
Homestead District Works,
Carnegie-Illinois Steel Corp., Pittsburgh

o o o

mately 100,000 gal of fuel oil are consumed per day with ten furnaces in operation.

The main building is 162 ft wide and 1404 ft long with columns on 108 ft centers. Ample space is provided for large furnaces with an 85-ft wide charging floor and a 77-ft wide pouring aisle, 1948 ft long. Two 800-ton oil-fired hot metal mixers are located in an 88½ x 164 ft building at the eastern end of the openhearth building. Three 24,000-lb. charging machines handling 44-cu ft boxes are provided, together with two 150-ton hot metal cranes for charging the furnaces. Three 300-ton ladle cranes take care of the teeming operations, the ladles being rated at 225-ton capacity.

Hot metal comes into the plant on a standard gage track at ground level from Carrie Furnaces, 3 miles away, in 75-ton ladles and is raised 65 ft by crane to be poured into the mixers, see fig. 1. Charging metal is poured from the mixers into 100-ton hot metal ladles on cars which are taken to the designated furnace by an electric locomotive after having been weighed on a special track scale at the mixer. Under normal operating conditions, hot metal constitutes approximately two thirds of the metallics in the furnace charge.

Table I gives the principal dimensions of the furnaces. The bottoms are built up with 3½ in. of insulating concrete on the steel pans, covered with 9 in. of first quality firebrick on the front half, which in turn carries 12 in. of chrome-magnesite brick. The rear half has 21 in. of chrome magnesite brick and then the rammed bottom is applied to both halves to provide a thickness of 15 in. at the tap hole. The sloping backwall is faced with approximately 4 in. of fully rammed material and the back wall has 22½ in. of chrome-magnesite brick at the sill line. Chrome brick is used in the front wall at the door jambs and extends 8 in. below the sill line and 10 in. above. The body of the roof is built of 18x6x3 in. silica brick with ribs every five courses constructed of 22½x6x3 in. silica brick.

Doors and frames are water-cooled, as are also the main buckstays adjoining them. A separate cooler is provided over each door where archless doors are used. The monkey walls are water-cooled and a cooling pipe is built into the upper portion of each bridge wall as well as the end walls of the uptakes. A water-cooled roof is provided for the burner dog-house. The burner also has a water-cooled nose.

Each furnace is equipped with two sets of double checker chambers. These are substantially larger

FIG. 1—Hot metal, contained in 75-ton ladles, is raised 65 ft by crane to be poured into mixers.

than is customary with most furnaces of comparable size, each chamber being 13 ft 4½-in. wide by 30 ft long and approximately 25 ft high at the spring line. These checkers are operated at approximately 2200° to 2300°F. Nine of the furnaces have chimney-type checkers with 7½x7½-in. vertical openings and two have specially designed checkers with 9x7-in. vertical and 4½x3-in. horizontal openings. Each individual chamber has a total volume of 9714.2 cu ft and 5617.5 cu ft of checker brick.

A single slag pocket 18 ft 6 in. wide between side walls and 15 ft 3 in. between the false walls, 21 ft long and 16 ft 4¾ in. high at the crown is provided at each end of each furnace. The bottom of the slag pocket is approximately 26 ft below charging floor level.

Each chamber is connected with the main flue leading to the stack by flues 5 ft wide by 6 ft high plus 1 ft spring of roof (33.44 sq ft area). The main flue is 7 ft wide by 5 ft 7 in. high plus a 1 ft 5 in. spring to the roof, having an area of 45.9 sq ft. All underground flues have 13½ in. brick walls and roof, with 4½ in. of insulating concrete on the outside. Hot bases normally pass upward from the flue through a superheater and waste heat boiler to an induced draft fan, discharging through an insulated steel duct under the charging floor into the stack. The stacks are 150 ft high and 7 ft in diam inside the brick lining. All brick work in connection with the furnaces is well insulated, the amount and kind of insulation depending upon the location and need. Fig. 2 shows one of the reversing valves and the end of a pair of checker chambers.

The waste heat boilers are 650 hp horizontal fire tube units operating at 300 psi and 625°F steam temperature (fig. 3). Incoming gases are 1250° to 1350°F and approximately 2 in. negative pressure, discharging into the stack at 450° to 500°F and approximately 1 in. negative pressure. Records show that the boilers recover slightly more than one third of the gross heating value of the fuel fired in the openhearth furnaces, resulting in 32.6 boiler hp-hr per net ton of ingots produced by the furnaces. Under normal operating conditions the battery of boilers generates approxi-

TABLE I

Important Dimensions and Areas of Homestead Furnaces

Furnace	
Length of bath	52 ft
Width of bath	18 ft
Area of bath	936 sq ft
Depth of bath	31 in. (225 ton heat)
Height of skewbacks above foreplate	5 ft 1 in.
Rise of sloping backwall	13.24 in. per ft
Slope of backwall	51 degrees
Span of roof	22 ft 5½ in.
Rise of roof	3 ft 3 in.
Area above top of foreplate	153.2 sq ft
Distance charging floor rail to top of foreplate	2 ft 6 in.
Number of charging doors	5
Size of charging doors—width and height	5 ft 1 in. x 4 ft 3 in.
Height charging floor rail above pouring pit rail	22 ft
Ports	
Dimensions at throat or knuckle:	
Width at base	11 ft 6 in.
Width at top	13 ft
Span of roof	13 ft
Rise of roof	2 ft 3 in.
Design area of throat	88.6 sq ft
Distance center of knuckle to uptake heel	7 ft
Distance uptake heel to inside end wall	9 ft
Width of port at uptake	18 ft
Number of uptakes	2
Length of uptakes	9 ft
Width of uptakes	6 ft
Combined area of uptakes	108 sq ft
Distance between uptakes	6 ft
Width of burner trench	4 ft
Height of floor burner trench above foreplate	2 ft
Burner pipe diameter	1 in.
Burners project into furnace	11 ft 7 in.
Burner angle toward front of furnace (normal)	3 degrees
Height heel of uptake above foreplate (front)	3 ft 9 in.
Height heel of uptake above foreplate (back)	3 ft 6 in.
Height of straight port roof above foreplate at skewback	9 ft 3 in.
Length of straight port roof	9 ft
Rise of straight port roof	2 ft 3 in.
Length of sloping port roof	8 ft
Pitch of sloping roof	6¼ in. per ft

mately 165,000 lb of steam per hr.

Steam generated by the boilers pumps all the water required for the west end of the Homestead plant, heats the water as required, preheats and atomizes the fuel oil for the openhearth furnaces and the reheating furnaces in the slabbing and plate mills, and supplies the plant mains which, through reducing valves, furnish heat to the 100-in. and 160-in. plate mill buildings as well as the slabbing mill building.

The goal of openhearth furnace operation is the production of steel of proper quality at the highest rate consistent with good refractory life and fuel economy. This requires rapid heat transfer from furnace to charge, which in turn is dependent upon heating the furnace and regeneratory refractories to the highest safe operating temperature.

Reversal control at Homestead was designed so that, under operating conditions, no arbitrary limitation is imposed other than to keep the reversal interval within the optimum time range. Since, however, a near approach to complete automatic operation involves protection of refractories through the balancing of the temperatures of the furnace ends as well as emergency protection against temperature peaks above some upper limit, it was also felt essential to employ as an integral part of the control unit, a temperature-measuring instrument to register the true temperature of the refractory surfaces at some critical region in the hot ends of the regenerative zone.

The basic elements of the control embrace maximum and minimum time relays and a potentiometer recording-controller, combined with switches and relays to operate as follows:

(1) Reversal normally occurs within an optimum time range limited by the maximum and minimum settings to about 4 to 6 min variation, but the actual interval is less variable and closer to the minimum time setting.

(2) The margin between maximum and minimum time is utilized, together with a "floating temperature limit" in the potentiometric control instrument to correct any tendency toward temperature unbalance between ends of the furnace.

(3) A second "maximum temperature limit" in the potentiometer is utilized for reversal at any time as a means of emergency protection against overheating of the checker brick in the regenerators.

The general method of balancing the furnace is to extend heating time on the cooler and/or the more slowly heating regenerator so as to achieve temperature equality of the pair of regenerators on successive heating cycles. Automatic reversal control in use at O.H. No. 5 meets this requirement by imposing upon the furnaces a maximum and minimum reversal time, the optimum time being intermediate. Actual reversal time between these limits is automatically selected by a floating control switch in the instrument recording the temperature of the checker brick, in accordance with the temperature of the hotter regenerator, so as to give the minimum period to it and sufficient time within the maximum period to the cooler one to allow it to attain the same temperature. The true average temperature of the top courses of checker brick near the bridge wall is approximated by the response of a total-radiation pyrometer sighted on the brick.

Necessary control points for automatic reversal control are set by consideration of (1) the safe upper limit of operating temperature of the regenerator refractories, and (2) the optimum reversal time as determined by a study of the furnace design. In the present setup three settings are all that need to be used, namely, maximum temperature, maximum time and minimum time.

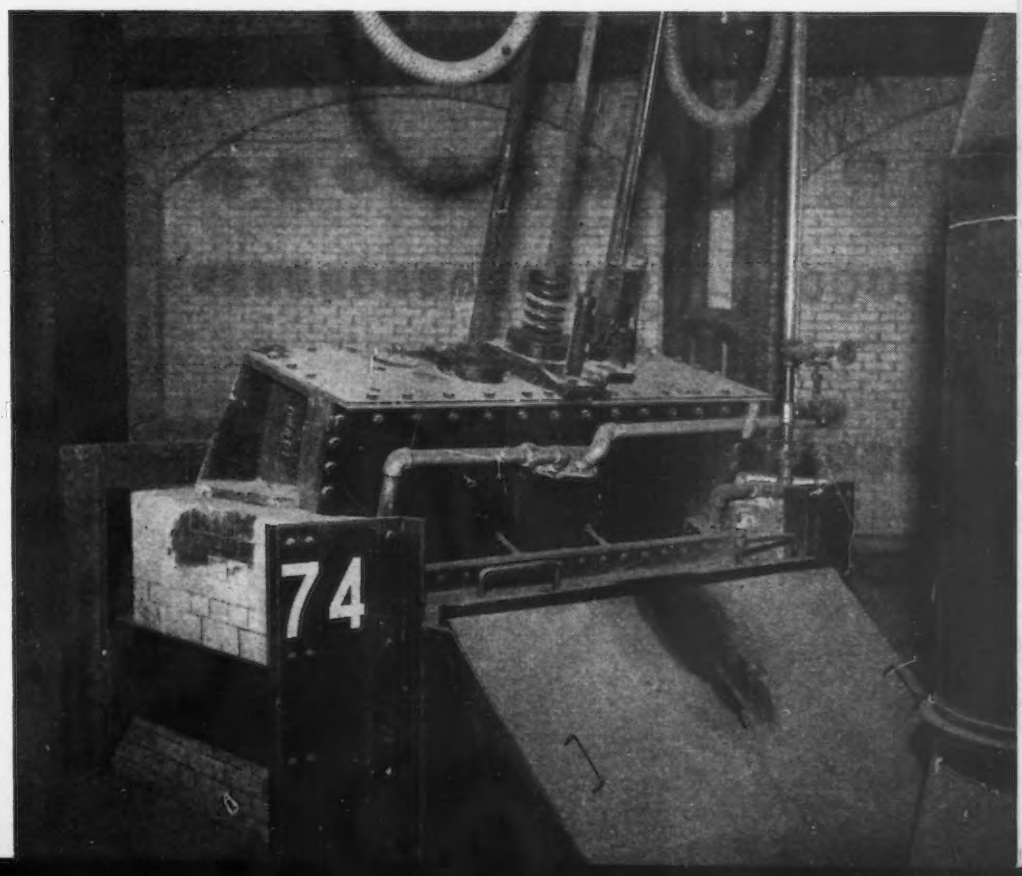
Four different modes of reversal are provided by the circuit arrangement developed in the U. S. Steel Corp. Research Laboratory at Kearny, N. J.; (1) manual reversal by pushbutton whenever desired by the furnace operator, (2) automatic reversal by the floating temperature limit between minimum and maximum time intervals, this being the normal mode of operation, (3) reversal at maximum time when checker temperature levels are falling, and (4) reversal at maximum temperature by the fixed limit in the controller.

Experience with this system of reversal control indicates that the following conditions are successfully met:

(1) The period between successive reversals is always within a certain optimum range, except when a shorter period is needed for some secondary purpose or to avoid a peak of excessive temperature.

(2) Measurement of brick temperature at some

FIG. 2—Furnace reversing valve and end of a pair of checker chambers.



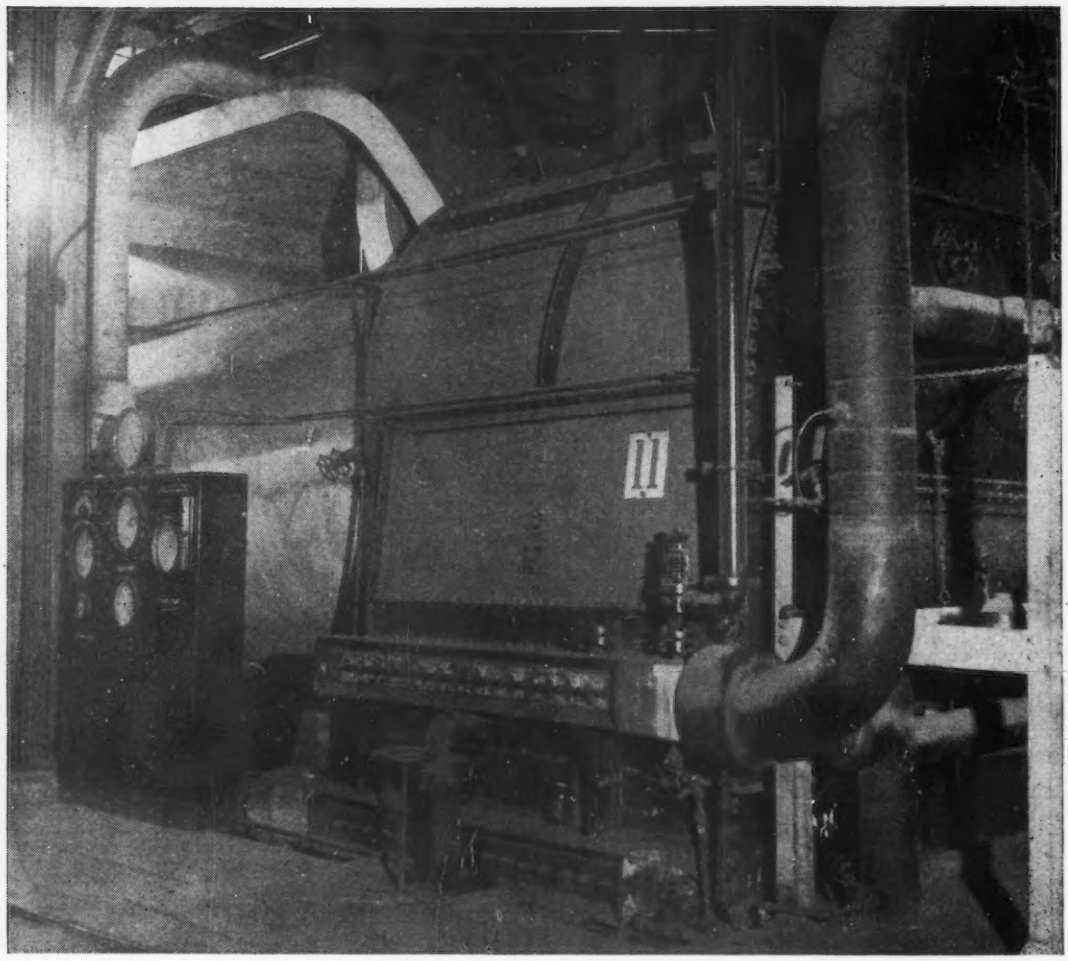


FIG. 3—Intake end of waste heat boiler showing instrument board.

point in the hotter regenerative zones of the top checker brick by radiation units, thus avoiding the ordinary thermocouple difficulties at such temperature levels, with provision for shortening of reversal period when a desired maximum temperature is approached.

(3) Continuous balancing between ends at all times when on automatic control; provision for manual reversal at any time, with rapid readjustment to balance following manual reversals during temporary periods.

(4) A continuous record of the measured temperatures in top checker zones to give the operator a better basis for control of such factors as rate of fuel input and air leakage above floor level.

(5) Absence of need for periodic or occasional change in any temperature or time setting in the control unit, thus making the control more nearly completely automatic.

In operation at Homestead, the furnaces are automatically reversed when either of the two checkers being heated reaches the floating control temperature, subject to minimum and maximum time limitations, which are easily set by the operator. If either of the checkers reaches the floating control temperature in less than the minimum time, reversal does not occur until the minimum time has elapsed, but the floating control temperature is then automatically raised to the temperature of the checkers at the time of reversal. If, however, the temperature has not been reached within the set maximum time, reversal takes place automatically, but the floating control temperature is automatically reduced to that established in the checkers. Thus the control is adjusted automatically as the heat progresses and the two ends of the furnace are kept in balance.

Checker brickwork is protected by means of a radiation pyrometer sighted on its top surface near the furnace end and the temperatures of each checker recorded on a four-record chart. If any of the checkers exceed a predetermined upper limit, a contact reverses operations regardless of preset automatic time controls. Overriding manual control may be exercised at any time by merely pushing a button.

Furnace pressures are measured near the center of the roof. They are automatically maintained as desired by adjusting the louvers in the inlet to the induced draft fan. When necessary, they may be controlled manually and set as required to give the desired furnace pressure as indicated by the furnace pressure gage. The amount of air going to the furnace, introduced into the flues at the reversing valves, is controlled by vanes in the inlet of the forced draft fan, adjustable from the instrument board. This fan takes its air from the alley running between the checker chambers and the boilers and acts to ventilate the basement and greatly improve working conditions there, particularly during warm weather. Fuel supply is normally maintained constant as set on a dial at the instrument board. Instrument control is also provided for maintaining a constant air-fuel ratio. The most desirable combinations of atomizing steam, fuel, com-

bustion air, and furnace pressure are determined by means of a flame radiation pyrometer mounted on a portable carriage.

Every effort was made to make the operation of the new furnaces at Homestead as nearly automatic as possible, thereby permitting the melters and their assistants to watch the actual steelmaking operations more closely, yet permitting them to assume manual control of any phase of the work at any time. Facing each furnace is a separate control house carrying an open panel on which are installed the various indicating and recording instruments, control levers, push buttons and signals. Starters and controllers, as well as all wiring and equipment subject to routine inspection and maintenance are, however, housed behind the control panel so as to protect them from dust and provide good operating conditions. The furnace operator does not have to enter the control house to make any of his furnace adjustments, but can stand in front of the control panel and open or close any of the five doors on his furnace, operate waste gas valves, or make adjustments of fuel, air or furnace pressure with the furnace in full view. Fig. 4 shows the arrangement of the furnace controls.

An interesting feature of the furnace construction is that which provides for the simultaneous removal of slag from both the front and back of the furnace, thus increasing production and at the same time improving quality control by assuring more complete removal of the slag. The sill plate of the center door is of special design, as is also the facing, to make this possible. All door openings are banked with dolomite under operating conditions, but this is raked away at the center door when slag is to be drawn off. The slag runs through a chute into a specially designed slag pot centered below. This thimble can then be run forward between the checkers and taken away by one of the ladle cranes after the heat has been tapped. Final run-off slag is handled in the usual manner at the back of the furnace. Fig. 5 shows this front slag unit which has proved extremely helpful in speeding up slagging operations. It will be seen that the design is such as to eliminate difficulty from spills, and that cleaning out the alleyway between the checkers is a simple and speedy operation that can be done at almost any time.

When furnace repairs are necessary, the furnace can be cooled quickly by opening the furnace doors and running the induced draft fan, thus drawing a large volume of cool air from the charging floor through the furnace.

Movement of ore, scrap, limestone, alloys and hot metal is handled by a coordinated system of high level tracks, chutes, bins and conveyors and ample room is provided at all points. For example, standard railroad cars can be handled easily on the charging floor without interfering with the charging machines. It is likewise possible to drive a truck through the basement, which also provides room for a standard gage railroad track as well as the necessary blower equipment.

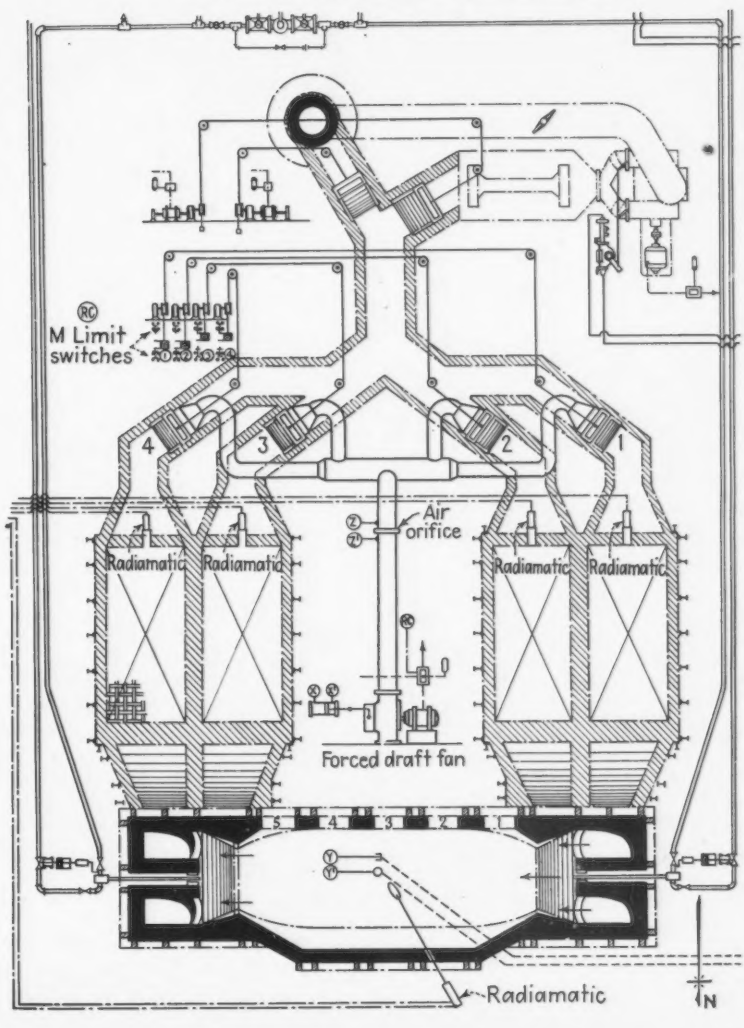
Twenty bins are provided for limestone and ore, four being reserved for hard ore, four for limestone, and 12 for charge ore. These materials come to the plant on the upper level in bottom-dump cars, discharging directly into bins which in turn feed into 44-cu ft charging boxes through hand-operated quadrant gates. These boxes are transferred from the lower level to the charging floor over standard gage railroad tracks by a diesel-electric locomotive. In assembling the charge, the cars carrying the charging boxes are shifted below the bins by means of a standard car puller unit.

Charging Floor Arrangement

Pig iron, carbon steel and alloy steel scrap comes to the two-level scrap yard, which is under cover, at the charging floor level in gondola cars. The material may be unloaded by magnet crane directly into charging boxes or to the stockpile on the ground level. Space is available to stock approximately 40,000 tons of special scrap, the three principal classifications being (1) over 3 pct Ni, (2) copper-bearing steel, and (3) nickel-molybdenum scrap. Provision is made for all crop from the 45-in. slabbing mill to be loaded directly from the shears into charging boxes, as is also the case at the 100-in. and 160-in. plate mills, which greatly facilitates scrap handling.

Raw dolomite for bank maintenance is delivered

FIG. 4—Diagram showing arrangement of furnace controls.



in hopper cars on the upper level, discharging by gravity into six bins, each of 60 tons capacity. These bins discharge through vibrating feeders onto a horizontal belt conveyor which feeds a bucket elevator. This delivers the dolomite to an overhead bin 40 ft above the charging floor level. From this bin the material is fed through a rotating spout to transfer or dolomite machine boxes on the charging floor level. These in turn are taken by crane to the dolomite-throwing machine or unloaded on the charging floor as desired. Double-burned dolomite is delivered in container cars direct to the charging floor for use as required in bottom and bank maintenance.

Ferrosilicon (50 pct) and ferromanganese (80 pct) come into the west end of the furnace building on the charging floor level in box or gondola cars respectively and are unloaded by hand to a crusher car running over a series of bins on the lower level. The double-barreled crusher is set to a 2-in. opening in the case of the ferrosilicon and 3 in. for the ferromanganese. The crushed product reaches the bins with about 90 pct passing a 1-in. screen. From the storage bins these materials are discharged through spouts controlled on the upper level into specially designed transfer boxes which are picked up by the ladle cranes and taken to bins behind each furnace.

Other alloys are unloaded directly from railroad cars or trucks into bins along the charging floor column line. A 2-ton electric lift truck is loaded from these bins as required, taking its charge to scales, one at either end of the charging floor. After weighing, the alloy addition is transferred to charging boxes for furnace additions in the case of copper, chromium, manganese, nickel, spiegel or 90 pct ferrosilicon, or to floor boxes in the case of phosphorus, 75 pct ferrosilicon, aluminum, vanadium and titanium. From these drop-bottom floor boxes, the alloy is transferred to self-dumping hopper buckets which are picked up by the jib crane at each furnace and set over a chute which delivers the material into the ladle when the heat is being tapped.

Special Casting Pit Available

It is impossible to cover in this article the many improvements which have been incorporated into this modern plant. Provision is made for drying and bagging anthracite coal, and convenient and efficient equipment installed for handling stopper rods and for lining and drying ladles. A special casting pit is available for casting ingots weighing up to 260 tops apiece. This pit includes four slow cooling pits, and six other annealing pits are available for heating or cooling large ingots of special analysis steel.

Two carbo-analyzer buildings facilitate preliminary carbon analysis and these buildings are connected to the shop chemical laboratory by a pneumatic tube system. These units are also connected to the main plant chemical laboratory by a pneumatic tube system as well as a teletype system for analysis reports and control instructions from the steel distributor's office.

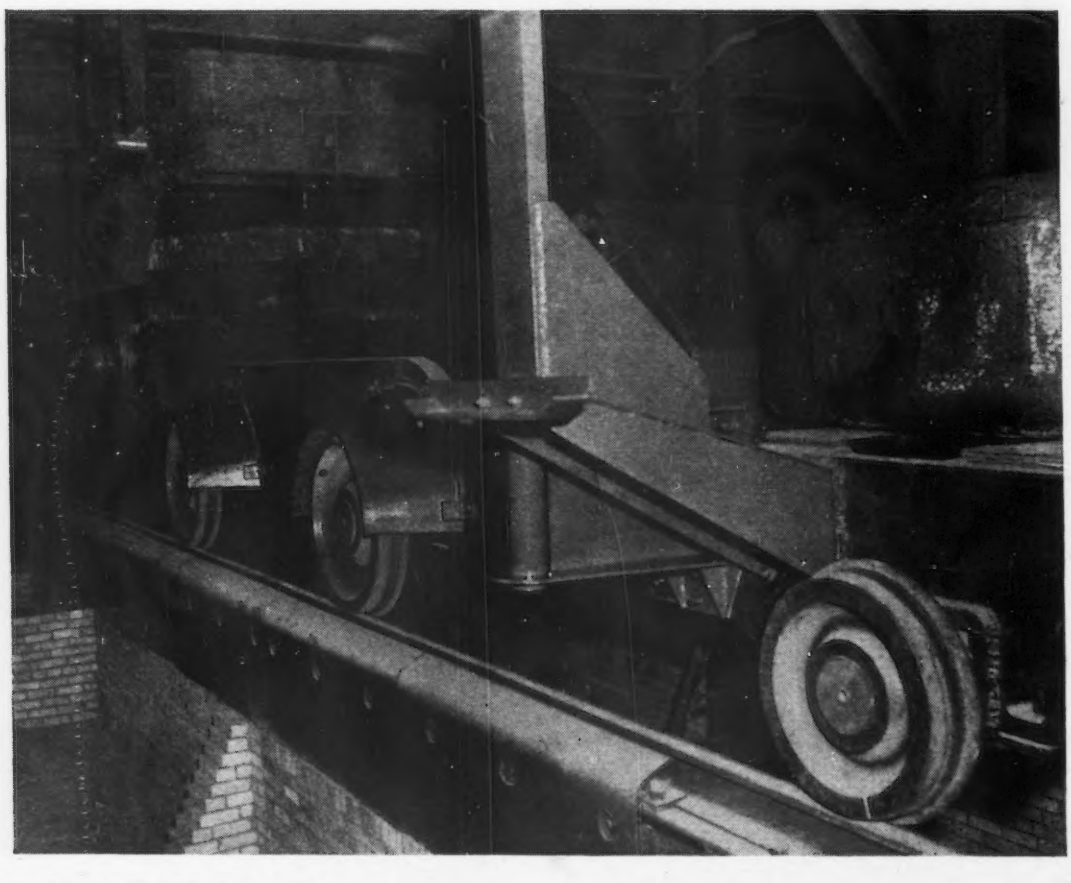


FIG. 5 — Cinder buggy positioned to receive front flush slag.

An Economic Approach to Hardenability

With the introduction of H steels a few years ago, the alloy steel industry took practical advantage of the huge strides recently made in the science of hardenability. The author proposes the use of minimum H band DI as a reliable, simple index in attacking the problem of using the cheapest alloy which will satisfactorily make the part. Correlations of "cost per unit hardenability" data of various H steels indicate some interesting economic concepts surrounding the use of alloys which are based primarily on hardenability. A comparison of calculated versus H band DI values is also offered in this the concluding section of a two-part article.

o o o

By D. I. BROWN
Chicago Regional Editor

o o o

IN the first part of this article published last week it was established that cost bore no consistent relationship to the hardenability of alloy steel. The hardenability standard used was that of the calculated *DI* from the mean of the chemical ranges. Such a standard cannot be used by a plant precisely interested in the hardness of treated parts since performances based on average hardenability cannot be risked. Rather, consumers must be assured of 100 pct quality and therefore must rely on minimum hardenability, which will guarantee that all parts will quench-out above the absolute minimum hardness required at various positions on the part.

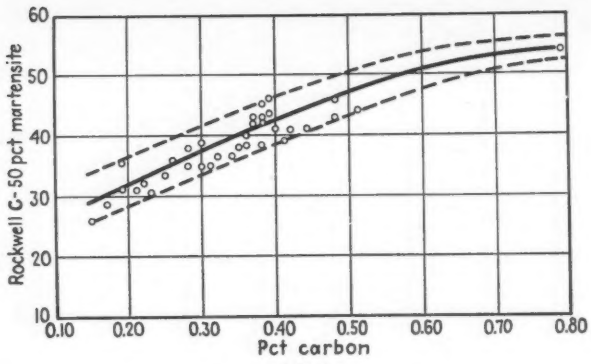
With the calculated *DI* values there was no assurance that some heats would not fall below the hardenability required in view of the possibility of the mill producing a heat of "low side" chemistry. This heat may be within the minimum chemistry prescribed but still below the mean of the hardenability based on the middle of the chemical range. Fortunately, a far better method of evaluating hardenability is now available. Instead of basing the measure of hardenability on the calculated or average hardenability, the use of the H bands of the H steels can be employed. This newer method circumvents any inaccuracies of calculated methods and offers the only reliable yardstick of hardenability. Not all steels have been available as H steels, but more are constantly being added and when the new AISI, SAE Contributions to Metallurgy No. 11 appears, almost every popular standard grade will be available on an H band basis.

In the first part of this two-part article, THE IRON AGE, *March 27, p. 42, the author presented data comparing the various alloy steels on the basis of "cost per unit hardenability obtained," for each steel. The hardenability standard used was that of the* DI *calculated from the mean of the chemical ranges.*

The consumers who use H steels specify minimum or maximum or both Rockwell C hardness values on the band when ordering their requirements. In a cost comparison of the alloy grades under such a system a standard hardenability index had to be chosen as the different hardnesses of the various positions are too unwieldy in number and can't be correlated. The index chosen for the second part of the study is the minimum H band DI at the 50 pct martensite hardness point. Through the work done by J. M. Hodge and M. A. Orehoski of the Carnegie-Illinois Steel Corp., almost any percent martensite structure can be used to arrive at the required minimum *DI* value. This minimum is guaranteed as the mills must meet the band requirement when an *H* steel is ordered so that actual rather than calculated hardenability can be relied upon.

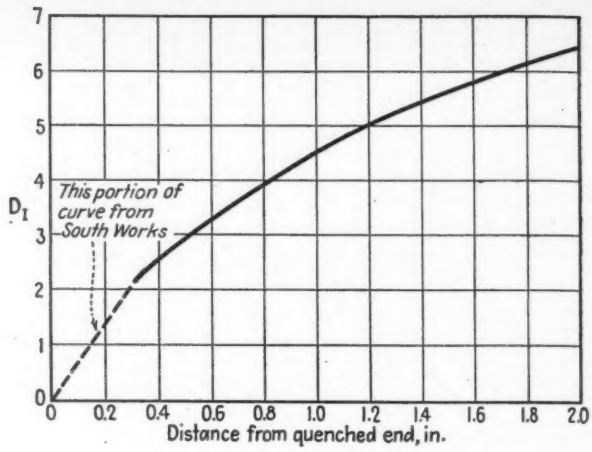
The process of arriving at the minimum *DI* needed in an *H* steel is relatively simple. The minimum carbon content of the grade in question is employed to determine the hardness level for that carbon content with a choice of many percent martensite structures. For this discussion 50 pct martensite was again chosen, one of the reasons being that this structure was used in the first part of the study. From fig. 8, the 50 pct hardness for the carbon content is determined. This hardness value is then compared to the published *H* band for the grade in question and the corresponding end-quench test position at which this hardness occurs on the minimum line of the band is determined. Using fig. 9, the minimum Jominy position can be employed to ascertain the matching *DI* at 50 pct martensite. This type of figure is obtainable for other percentages of martensite.

The *DI* thus obtained is the one which will determine the alloy grade that must be used to guarantee 100 pct satisfactory hardness in a treated part with the following provision: Since hardenability depends on cooling rate, the mass of the part to be quenched and the quenching power of the bath must first be



ABOVE

FIG. 8—Hardness of martensite products as function of carbon content, from Hodge and Orehoski.[2]



RIGHT

FIG. 9—Revised curve for conversion of Jominy distance to ideal diameter, from Hodge and Orehoski.[1]

determined, if a logical choice of steel is to be made. As previously mentioned, considerable reliable published data are available to help make such determinations. If the user prefers to base his requirements on percentages of martensite other than 50 pct the proper adjustment can be made. In using the minimum *DI* vaues determined from the bottom of the *H* band, the consumer may oftentimes receive a steel containing more hardenability than is actually needed, but never will a consumer receive a steel in which the hardenability is too low. The maximum hardenability can also be specified within the limits of the bands so that the spread is not too great and dangerously high hardenabilities are precluded.

A higher draw temperature will usually correct a part made from too high a hardening steel providing the part does not crack, warp or otherwise become damaged, whereas nothing can be done to make a low hardening steel more hardenable except increase the severity of the quench. This is not always possible for many reasons. One primary governing factor is that to obtain a better quench it might be necessary to revert to water which would increase the possibility of cracking the part. Even if more hardenability could be induced by a better quench the carbon content may be too low to meet the required Rockwell C at various positions in the part as hardenability and hardness are not synonymous.

Table III lists a few of the *H* steels showing the minimum carbon which was used to establish the 50 pct hardness value. It will be noticed that the minimum carbon content was chosen from standard steel chemistry. Such a choice is subject to question since the *H* bands apply on steels which generally have a lower carbon content due to the widening of the chemical ranges. The *H* steels show 0.01 less carbon than standard chemistry in the 0.40 C grade. The discrepancy is not large as either method will produce a *DI* that for all practical purposes meets the required accuracy. In fact, many metallurgists claim that the industry, in developing hardenability bands, it attempting to develop hardness limits which are outside the accuracy of the Rockwell machine, and therefore they accept the precepts with reservation. In table III the resultant minimum *DI* appears at the right.

Table IV compares the *H* band *DI* to the calculated *DI* (employed in part I of this article) of the 0.40 C steels which are available as *H* steels. It was believed that the *H* band *DI* values would be lower on all grades than the calculated *DI* from the mean of the chemical

[2] *J. M. Hodge and M. A. Orehoski, Metals Technology, TP 1800, 1945.*

TABLE III

A List of H Steels Showing Minimum Carbon Content Used to Establish 50 Pct Martensite Hardness Value

AISI Grade	Carbon**, Pct	50 Pct Martensite Hardness	Min J Distance	50 Pct Martensite DI
4340H	0.38	42 Rc	34/16	6.50
4140H	0.38	42	17/32	3.00
3140H	0.38	42	16/32	2.90
8740H	0.38	42	15/32	2.80
8640H	0.38	42	13/32	2.60
4640H	0.39	42	25/64	2.55
9440H	0.38	42	11/32	2.40
1340H	0.38	42	21/64	2.35
5140H	0.38	42	5/16	2.25
8660H	0.55	49.5	23/32	3.70
8655H	0.50	47.5	21/32	3.45
8650H	0.43	43.5	9/16	3.20
9262H	0.55	49.5	29/64	2.80
9261H	0.55	49.5	21/64	2.35
9260H	0.55	49.5	17/64	1.95
6150H	0.43	45.5	31/64	2.90
5150H	0.43	45.5	25/64	2.55
*4068	0.64	52	9/32	1.90
*4063	0.60	51	7/32	1.60

* Estimated minimum hardenability.
** Minimum content of standard steel grades used here.

TABLE IV

Comparison of H Band DI to Calculated DI of the 0.40 C Steels Which Are Available as H Steels

Grade	Calculated DI Mean of Chemical Range	H Band Min DI on 50 Pct Martensite Hardness	Increase or Decrease of H Band DI to Calculated DI, Pct
4340	7.40	6.50	12.2 decrease
4140	5.25	3.00	42.8 decrease
3140	3.45	2.90	15.9 decrease
8740	4.70	2.80	40.5 decrease
8640	4.30	2.60	39.6 decrease
4640	2.35	2.55	8.5 *increase*
9440	3.55	2.40	32.4 decrease
1340	2.10	2.35	11.9 *increase*
5140	2.70	2.25	16.7 decrease

ranges. Table IV proves this is not the case and further, there is no proportionate percentage decrease between grades. The reason for the 4600 and 1300 series discrepancy is not clear, nor is the difference between the percent decrease in the *DI* of the other grades wholly understood. It could be assumed from this comparison that there is an error in some of the *H* band levels, but it appears that a better explanation lies in the inconsistency of calculated results. It is known that some combinations of certain elements of various contents produce totally unreliable calculated hardenability, and therein, it is thought, lies the reason for the wide fluctuation of *H* band *DI* to the calculated values. Some may contend that the comparison should have been based on calculated *DI* from the minimum of the chemical ranges. The reasons for choosing the mean of the chemical ranges for calculated *DI* values were clearly stated in the first part of this article. It is also further believed that a calculated *DI* from the "bottom of the chemistry" when compared to a minimum *H* band *DI* would be much more divergent than the comparison chosen.

Now that a reliable and practical hardenability index has been established, it is of interest to again compare costs, since table IV indicates marked differences are present. The cost or price of the various grades represents grade extra prices only, such as were previously used, since *H* steels are sold at the same price as standard alloy chemistries. Fig. 10 presents the cost ratio of the available *H* steels at the 0.40 C level and should be compared with the 0.40 C group in fig. 2 in the first part of this article. Again, the grades on the right in the graph are of lowest ratio and therefore the most for the money. It is seen that 4140 is no longer the cheapest alloy and that the 8600, 8700 and 4300 series have reversed their positions.

In both comparisons the 4600 series remains expensive although to a lesser degree when based on an *H* band *DI*. The 5100 series is conversely relatively cheap by either standard. Also of importance is the fact that the cost ratio increased when the *H* band *DI* were used; this is because the lowest possible guaranteed hardenability was employed. Because all steels are not yet available as *H* steels, the study could not be projected as extensively as it was in part I of the article, but the spring steel comparison is again presented as certain interesting features are apparent.

Fig. 11, wherein *H* band *DI* was chosen as the hardenability index, should be compared to fig. 3 covering spring steels shown in the first part of the study. The lower *DI* values have caused all steels to show higher cost ratios, and in the tractor leaf application it will be seen that the order or sequence of grade remains the same on a cost ratio basis. In the two Amola grades shown under the passenger and light truck leaf spring classsification, the *DI* had to be calculated and adjusted, since there are no *H* bands on these grades. It is apparent that if the section and quench permit, 5150 is by far the cheapest choice for this application. This was the case in the first comparison in part I, but the spread was not as extensive. The 6150 and the one Amola grade are anything but economical in this com parison. In fact, the successful use of

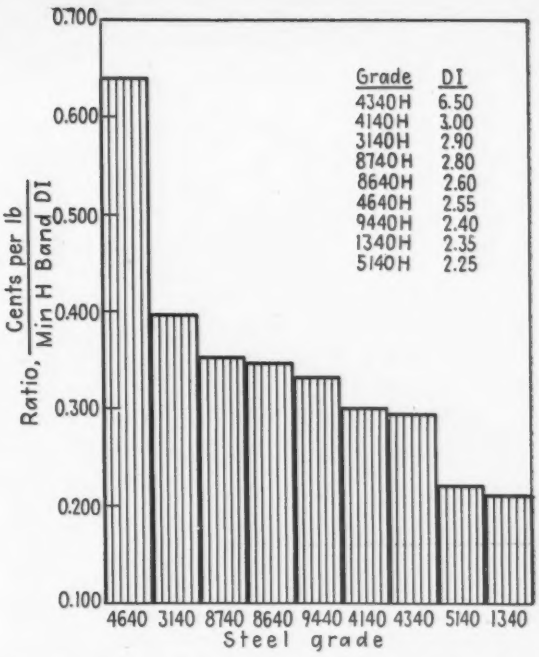


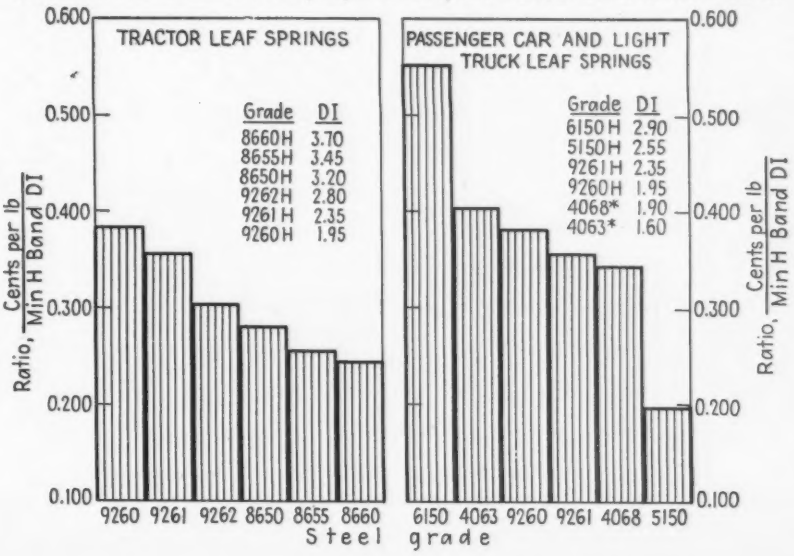
FIG. 10—Ratio of cents per lb to minimum *H* band *DI*; 0.40 C grades. Asterisk denotes minimum hardenability adjusted to represent theoretical *H* band.

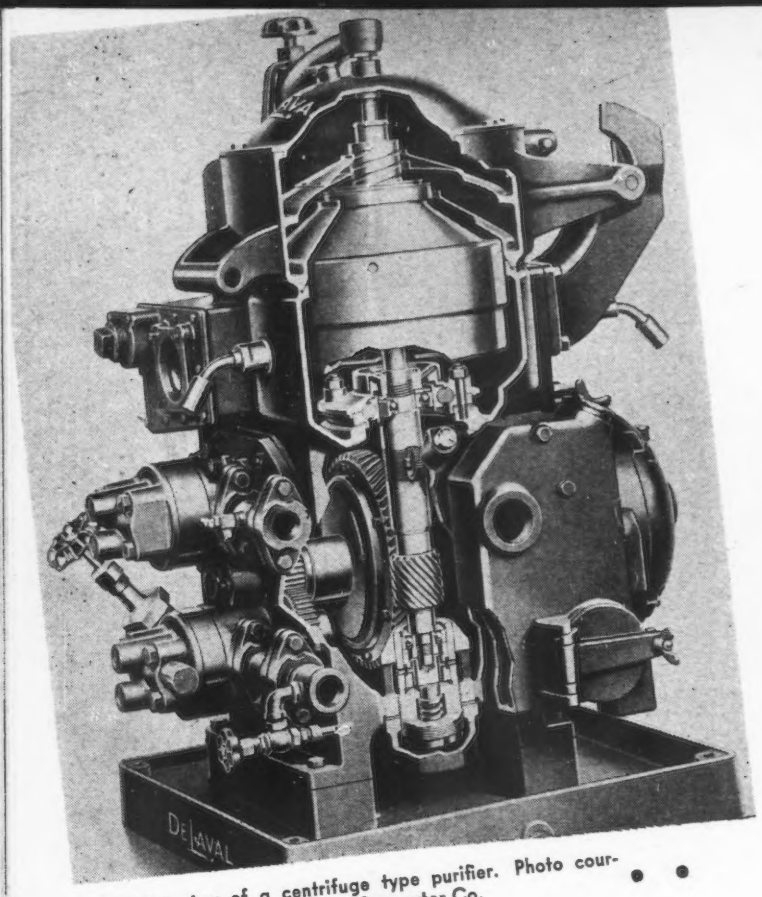
Amola for springs by one large auto builder leads one to question whether hardenability is of any importance in light spring sections. The Amola grades are notably shallow hardening steels and, as shown by fig. 11, relatively expensive for such hardenability as they do contain. If deep hardenability is of any importance in such spring sections, the use of Amola can hardly be justified, on a purely metallurgical basis. However, the company that uses the large tonnages of this grade happens to hold the patents covering the manufacture of Amola and for that reason this type of steel should probably not be subject to an unbiased cost v. hardenability comparison.

When the new AISI, SAE publication appears, it will be possible to widen the comparison to include

(CONTINUED ON PAGE 160)

FIG. 11—Spring steel, heavy tonnage grades, oil quenched and tempered to 175,000 to 240,000 psi. Ratio of cents per lb to minimum *H* band *DI*. Asterisk denotes calculated minimum hardenability adjusted to represent bottom of theoretical *H* band.





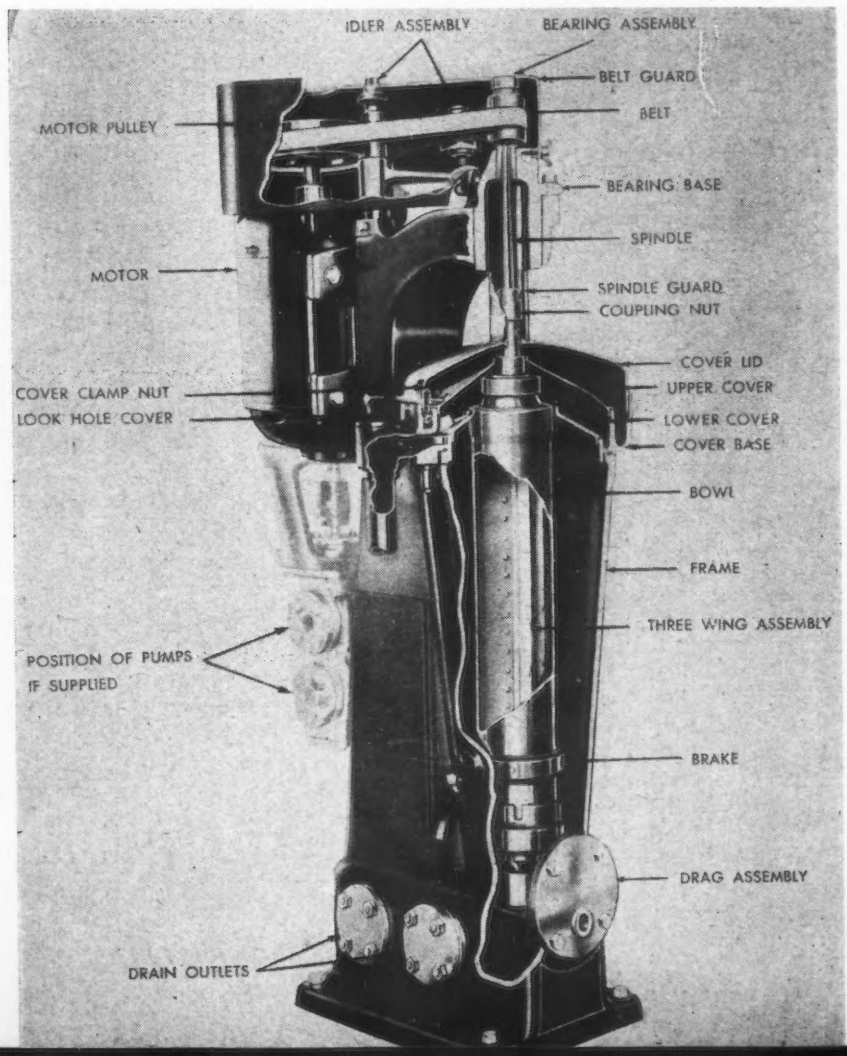
SECTION view of a centrifuge type purifier. Photo courtesy De Laval Separator Co.

Oil Purification,

By BRIAN CORRIGAN
Technical and Research Div., The Texas Co., New York

Experience has indicated a definite relationship between effective lubrication and oil purification, filtration and reclamation. As an aid to engineers in evaluating the effectiveness of their reclamation procedures, this article discusses the characteristics of used oil, explains the various methods which may be used for purifying, filtering or reclaiming, and lists herein the advantages and disadvantages of each method.

DETAILS of the Sharples Super-Centrifuge purifier. Photo courtesy Sharples Corp.



EXTENDING the useful life of lubricating oil has been and continues to remain an important part of good equipment maintenance. While methods of oil purification, filtration or reclamation will assist materially in prolonging the useful life of lubricating oil, a more important requirement is proper application of the right type of lubricating oil to a given piece of equipment.

If the right type of lubricating oil is applied to equipment which is properly operated and maintained, the oil will provide satisfactory performance for relatively long periods of service before replacement of the oil is desirable.

Even though lubricating oil is accorded good treatment through proper operation and maintenance of equipment, it nevertheless deteriorates and/or becomes contaminated after extended periods of use. This period is dependent upon the type and severity of service. The method used for purification, filtration or reclamation of the used oil and whether this should be done during operation or after removal of the oil from the system, require individual consideration, since obviously the cost of oil life extension

Filtration and Reclamation

must not exceed the value of the amount of new oil to be purchased if one of the methods is not used. This discussion is presented to assist the operator of equipment to better evaluate his particular problems of lubrication.

Characteristics of Used Oils

Used oils are characterized by one or more of the following conditions:

(1) Oil which has deteriorated due to oxidation in the presence of air or other oxygen-containing media, accompanied by high temperature service. Products of oxidation may be soluble or insoluble in the used oil depending upon the degree of deterioration.

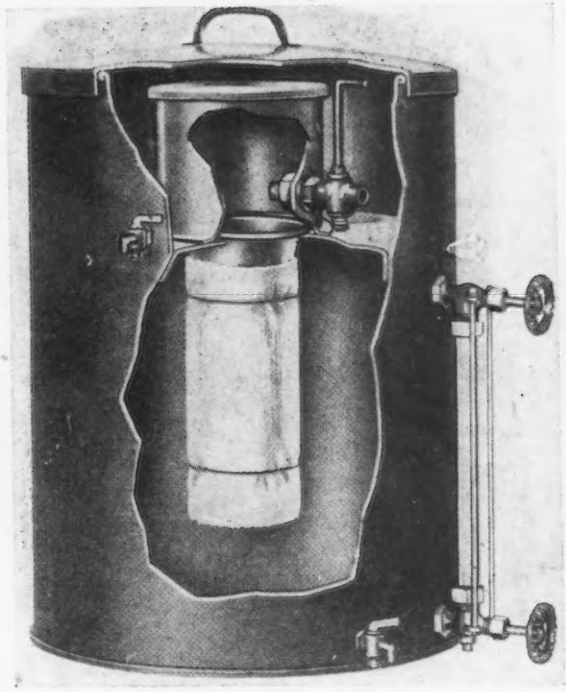
(2) Oil which has deteriorated due to polymerization, a result of high as well as normal temperature service. Products of polymerization may be soluble or insoluble in the used oil.

(3) Oil which has been contaminated with extraneous matter. Products of contamination include:

- (a) Dirt and dust common to region in which equipment operates.
- (b) Core sand that has remained in metal casting from the foundry.
- (c) Metal particles from the time equipment was in the machine or repair shop.
- (d) Metal particles due to disintegration or wearing of parts such as bearings and piston rings.
- (e) Carbon and other products of partial decomposition or oxidation resulting from destruction of oil or incomplete combustion of fuel.
- (f) Water and antifreeze.
- (g) Dilution with fuels.
- (h) Miscellaneous, such as paint, asbestos, or linseed oil.

If used oils are to be continued in service, the products of oxidation and polymerization and any foreign contaminants should be removed. There are many ways of removing such materials from oil, but all fall into three basic types of equipment:

- (1) Gravity purification methods, such as gravity settling and centrifuging, which are capable of removing only insoluble materials.
- (2) Filtering equipment which can remove insoluble matter and



RIGHT
A CARTRIDGE type batch filter especially designed as a portable unit. Photo courtesy Bowser, Inc.

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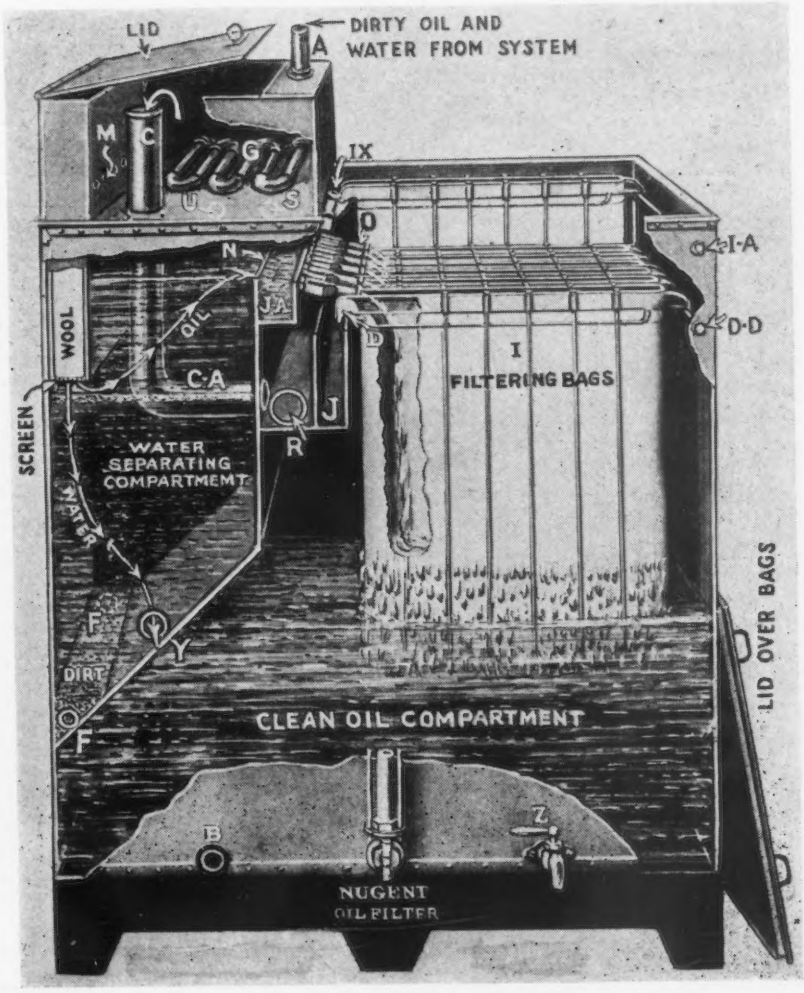
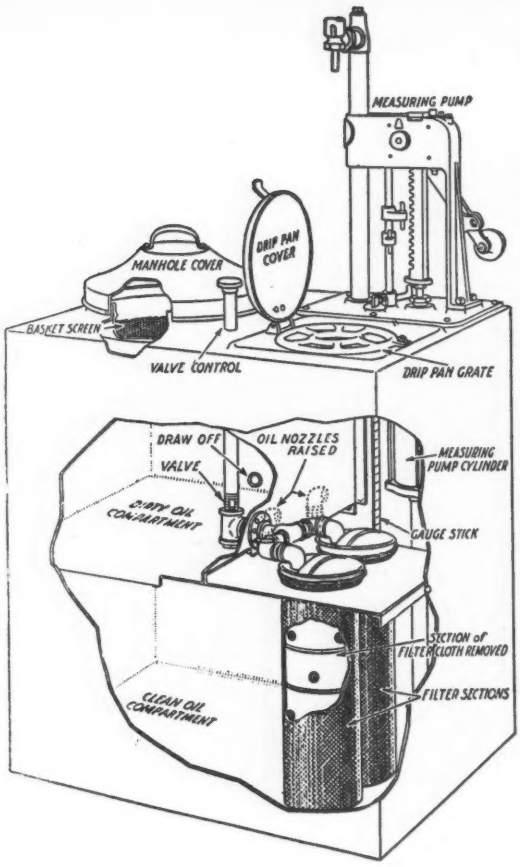
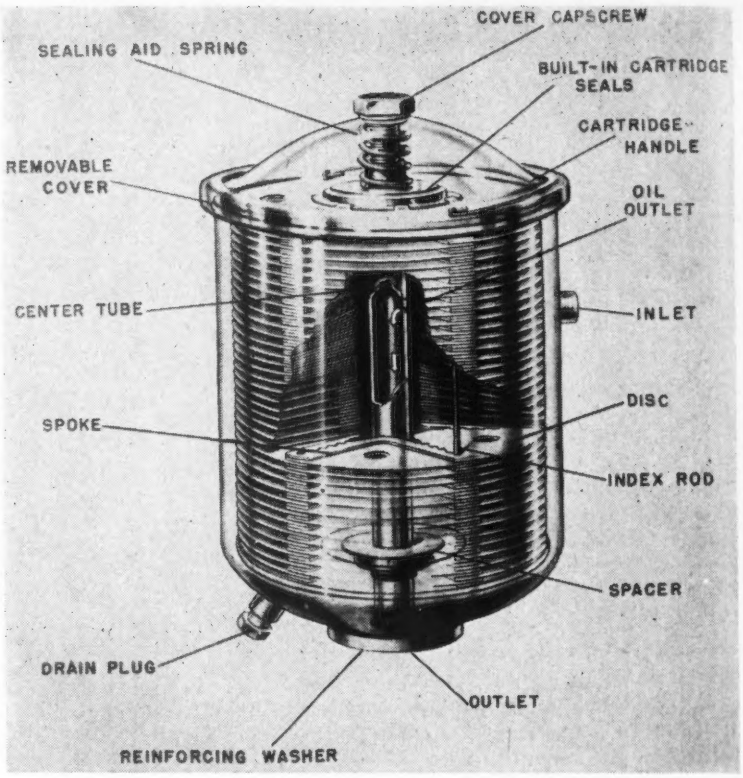
BELOW
DETAILS of the Nugent bag type oil filter. Photo courtesy Wm. W. Nugent & Co., Inc.





COMBINATION oil filter and storage tank. This unit is especially suitable for batch filtration of crankcase oils from power plant machinery, compressors and small turbines. Photo courtesy Bowser, Inc.



CONSTRUCTION details of the paper cartridge type filter. Photo courtesy Fram Corp.

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some soluble products depending on type of media.

(3) Reclaiming methods which not only can remove insoluble materials, but are also capable of removing varying amounts of soluble products depending upon equipment design and operating conditions.

Gravity Purification of Lubricating Oil

Methods for gravity purification of lubricating oils include simple gravity settling followed by decantation and/or treatment by centrifuging either wet or dry.

Settling followed by decantation—The simplest means of effecting some degree of purification of used lubricating oil is to permit the oil to rest in a settling tank for a period of time. During this time, and depending on temperature and efficiency of settling and decanting facilities, it is generally possible to remove the major part of the suspended insoluble oxidized material, foreign particles, dirt and water. Separation of such oil contaminants is made by gravity alone, and is adversely affected if stable emulsions exist.

Settling is most effective in horizontal tanks with V shaped or sloped bottoms and having either jacketed walls or steam coils for heating the oil to proper temperature. Depending on oil viscosity, best results are obtained at oil temperatures of 120° to 160°F. Excessive temperatures should be avoided to prevent the acceleration of oil oxidation. Practically no settling will occur while the oil is being heated because of the convection currents created. Settling at low temperatures should be avoided because the rate of separation is slowed up due to the higher viscosity of the oil.

Disadvantages of purifying oil by settling and decantation are as follows (assuming equipment for which oil is required has to operate continuously): (1) Two complete batches of oil are required; (2) it is generally necessary to shut the machine down to change the oil; (3) considerable space is required for settling tanks; (4) at least 10 days are usually required for satisfactory clarification; (5) while oil is in service, impurities are not removed as they collect, but are permitted to build up to some predetermined concentration at which time the batch is withdrawn and purified, and (6) purification is not complete. Insolubles which are close in gravity to that of the oil cannot be removed by this process.

Purification by this method is adaptable to all straight mineral oils such as those used for lubricating diesel and gas engines, air and refrigerating compressors, steam turbines and general plant equipment. It is important to understand that oils so handled are only partially clarified. They may still contain soluble oxidation and polymerization products as well as amounts of fuel dilution, depending on the type of service involved. Future use of purified oil will depend mainly on the length of service the oils have already undergone and the extent of oxidation and dilution. Heavy duty, additive-type oils cannot be purified by this method with any degree of success because of their dispersion characteristic. This property prevents

agglomeration of insoluble contaminants with the result that settling of these materials is all but impossible.

Treatment by Centrifuging

Purification by centrifuging employs the same basic principle as settling and decantation, but is faster and more complete because the separating force is several thousand times that of gravity. The centrifuge or centrifugal separator is a device for freeing the oil of suspended insoluble oxidized material, foreign mineral and carbonaceous matter, dirt and water. Claims are made that centrifuging an oil will also remove soluble oxidation products. This is generally not true, except in the case of some organic acids (only those more soluble in water than oil) which may be removed if water is added along with the oil being centrifuged. This is also true for mineral acids if present. Centrifuging wet, if started on new oil, will keep the accumulation of acids in the oil at a very low level. As with settling and decantation, a centrifuge will not separate liquids which are mutually soluble, such as fuel in lubricating oil. Likewise this method of purification will not remove colloidal foreign matter, particularly from heavy duty engine oils with dispersant properties.

The term "capacity," as applied to centrifuges, is often used loosely. A centrifuge may be said to have two capacities:

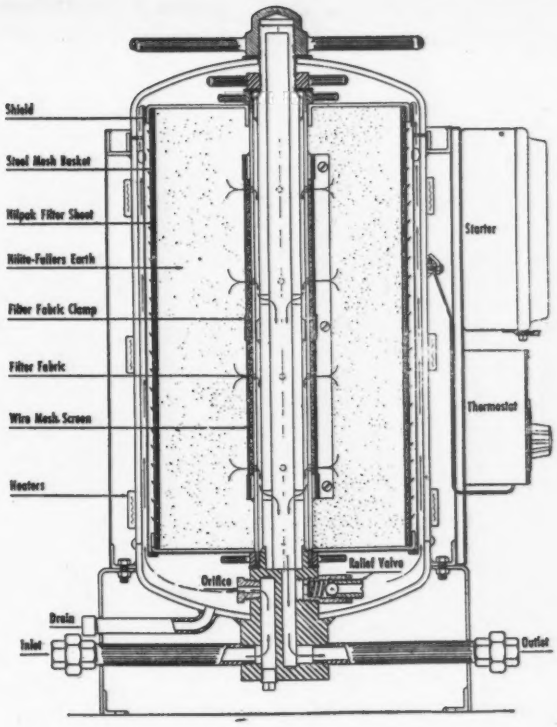
(1) Through-put capacity, which is the total quantity of oil that may be put through the machine without overflowing regardless of the degree of purification effected.

(2) Effective capacity, which is the quantity of oil that may be put through the machine with the desired degree of purification.

Effective capacity generally has no relation to through-put capacity but is of major consideration to the user. Effective capacity depends upon used oil viscosity, oil temperature in the centrifuge, degree of oil contamination, degree of purification desired, and persistency of emulsion if water is present. In selecting a centrifuge for use on a by-pass in a circulating system, it is best to choose one having a manufacturer's rated capacity sufficient to handle all of the oil in the system in some 3 to 6 hr. This is based on the assumption the centrifuge will be operated either continuously or intermittently on oil batches.

When centrifuges are used for oil purification, they should always be set to operate by the two-liquid discharge method. This does not necessarily mean that water should be added to the centrifuge, but a discharge opening should be provided to emit any water which may get into the oil system. This is particularly necessary: (1) in all marine turbine and diesel installations; (2) in land turbine installations; (3) when condensation is apt to occur, as when operating a diesel or gas engine intermittently or with a crankcase sufficiently cold to condense the water vapor present in blow-by gases, and (4) when oil storage tanks are buried in the ground.

The terms "wet" or "dry" centrifuging are used to indicate whether or not water is intentionally added to the oil at the centrifuge. Although it is somewhat inconvenient, cleaner oil will result by the addition of water to the oil at the centrifuge under proper operating conditions. Care must be taken to be sure stable emulsions are not formed as a result of introducing



HILCO clay type oil filter. Photo courtesy Hilliard Corp.

water at the centrifuge. Centrifuging wet has the following advantages:

(1) The water has a washing effect, aiding in the removal of impurities.

(2) The water carries away most of the lighter insoluble impurities which have gravities approximately the same as that of oil, permitting longer runs between cleanings.

(3) Some acids, particularly when freshly formed in lubricating oil, are more soluble in water than in oil and are thus removed, as are mineral acids.

(4) In many cases of corrosion of centrifuge bowl parts in service the corrosive attack has been markedly diminished, or entirely stopped, by feeding a small amount of fresh clean water, continuously into the centrifuge, thus diluting and washing out salt and acidic contaminants. This is particularly true for marine turbine and diesel installations.

The objections to wet centrifuging are:

(1) Due to the greater density of water, the water discharge must be of a greater diameter than the oil discharge to permit water to flow out of the centrifuge. Accordingly, if the water seal breaks, oil will flow out of the lower discharge instead of the oil discharge.

(2) If periodic cleaning of the centrifuge is neglected, the dirt-holding space may become filled with oil contaminants and water. When this occurs, the bowl overflows and dirt and water are not removed from the oil.

(3) Clean oil and water will not normally emulsify. If the oil becomes unusually dirty, emulsion difficulties may occur. In such cases the amount of water should be decreased, the oil temperature increased, or the oil feed rate temporarily reduced until satisfactory separa-

tion is again obtained. Normally a centrifuge will break an emulsion which is not too stable.

(4) Certain types of additives used in heavy-duty diesel engine oils and in inhibited turbine oils tend to concentrate at an oil-water interface with the result that at least a portion of such additives will be removed.

The results of purifying used lubricating oils by centrifuging are the same as those accomplished by settling and decantation, but in a more efficient and less time-consuming manner.

Lubricating Oil Filtration

Oil filters are of many types and are almost always installed in connection with the equipment being lubricated. Such filters are generally used in the forced-feed lubricating systems of internal combustion engines regardless of the type of service. Gas, gasoline, tractor and diesel engines fall in this category.

Oil filters under this heading are composed of housings in which removable elements or cells may be placed. When elements become partially clogged with oil contaminants, they can either be removed and cleaned or replaced with new elements, depending on type. Such an installation makes for simplicity in maintaining reasonably satisfactory oil performance. There is another type of oil filter composed of a housing and element in one unit. When this type becomes clogged, it is necessary to replace the whole assembly.

Depending on the kind, oil filters are capable of removing insoluble oxidized material, foreign mineral and metal particles, carbonaceous matter, water and dirt, and in certain cases some soluble oxidation products. Oil filters will not separate mutually soluble liquids, such as diluent or fuel from lubricating oil. Types of oil filters may be classified as follows:

(1) Metallic or mechanical (edge-type, copper ribbon, steel wool, screen, strainer). Filters of this type remove coarse contaminants such as metal chips and particles of grit and scale by means of closely woven metal screens. Removal of insoluble oxidized material is generally not effected unless the size of such particles is sufficiently large to be caught by the filter element openings. Soluble oxidized material, finely divided carbon particles, water, dust and finer insoluble oxidation products cannot be removed by such filters.

(2) Absorbent (cotton waste, wood pulp, wound yarn, felt, flannel, cloth, paper, mineral wool, quartz, diatomaceous earth, asbestos). Filters of this type not only remove coarse contaminants but also aid in the removal of finer insoluble particles such as carbon, dust and insoluble oxidized material. Certain of these filters remove mineral acids as well as water. Soluble oxidation products are not removed. Filtration is accompished by adhesion of contaminants to element structures, and absorption by the components of the filter due to porosity.

(3) Adsorbent (Fuller's earth, boneblack, charcoal, other active type clays—chemically treated paper and waste). In addition to removing coarse and fine contaminants, filters of this type are capable of reducing the amounts of soluble oxidized material and water to a limited extent. Such filters remove oil contaminants not only by mechanical means, but also as a result of chemical action and adsorption. Adsorbent filters may remove chemical additives blended with certain oils to improve performance characteristics, but this is not true in all cases.

Oil filters may be installed in either of the following ways: (1) Full flow—one receiving total oil supply from pump discharge; metallic or mechanical type filters are generally used for this purpose; and (2) Bypass—one receiving only a portion of the oil circulating in the system. Absorbent and adsorbent type filters are generally used for this purpose.

It should be pointed out that practically all types of filters are equipped with means of bypassing the oil when filter clogging occurs. Oil filtration is almost always employed in conjunction with internal combustion engine installations and is also used to some extent in connection with other equipment. For instance, filters of the absorbent or adsorbent types are sometimes used to supplement methods of oil purification (batch or centrifuge) in turbine installations. Where large oil storage facilities are available, metallic or mechanical type filters are generally used in the lines between tanks and equipment to be lubricated. Oil filters may be used in any lubricating system where sufficient pressure is available to force the oil through the filtering medium.

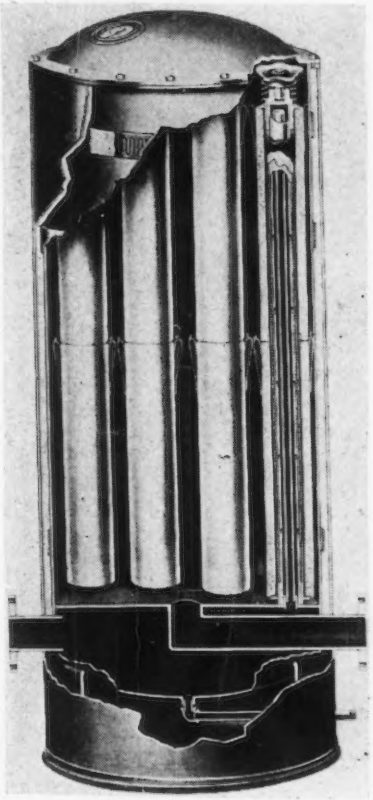
Lubricating Oil Reclamation

Used lubricating oils can be reclaimed or re-refined by a variety of methods, the more important of which are described in the following.

In the high temperature clay-type oil reclaimer, oil is purified by contact with Fuller's earth or similar activated clays. This can be done in batch or by continuous treatment. These reclaimers remove most of the solids present in used lubricating oil such as mineral matter, dirt and carbonaceous material. Soluble oxidation products, which are responsible for varnish and lacquer formations on hot engine surfaces, are reduced to an extent varying with clay efficiency, clay to oil ratio and operating conditions. This reclaiming method also reduces the amounts of water and organic acidity which may be present in the used oil. In this process the oil is often heated to 400°F, and in some reclaimers even higher under vacuum, which means volatile liquids such as gasoline are substantially removed. If used oil is contaminated with diesel fuel, however, only a portion of the fuel can be removed unless the reclaiming temperature is raised considerably above 600°F. Reclaiming at this temperature, however, may volatilize some of the lighter lubricating oil ends which will pass off with the diluent. The recovered oil will then be appreciably higher in viscosity than when new. If reclaimers are operated at temperatures much above 600°F, cracking of the oil will result. High temperature clay reclaimers will also remove most chemical materials which may have been added to lubricants to improve certain performance characteristics. For this reason clay type reclaimers should not be used to reclaim used additive oils unless the reclaimed oil is relegated to some service not requiring heavy-duty or additive type lubricants.

In a typical reclaimer a batch of used oil is placed in a cylindrical tank and heated electrically. Clay may be added and mixed by mechanical agitation prior to high temperature heating or after the oil has reached the proper temperature, usually around 400° to 425°F. This temperature is an average one

for reclaiming used stocks of diesel and gasoline engine crankcase oils. Following the agitation and heating period, which may vary from 15 min to an hour's time, the oil and clay mixture is forced by means of compressed air through one or two-stage paper filter presses which remove both clay and impurities. In another type of reclaimer the oil is pumped over a hot surface (electrically heated) which drives off water and fuel diluents. The hot oil is then passed through a bed of clay and a layer of filter paper which removes the remaining contaminants. This process is considerably slower than the one previously discussed. In still a third type of reclaimer employing contact filtration, a continual draft of air is blown over the oil being heated and mixed with clay. This aids in removing fuel dilution by hastening evaporation.



MULTIPLE cartridge clay type continuous oil purifier. Photo courtesy Honan-Crane Corp.

There is no limit to the amount of used oil which can be reclaimed by this general method, providing several units are in use. If the used oil is in fairly good condition, the amount of oil reclaimed will approximate the maximum rated capacity of the unit. If, on the other hand, the oil is badly contaminated and oxidized, the flow rate may be as low as 50 pct of the maximum rated capacity. The presence of water or chemical additives in the oil may reduce the flow rate appreciably. The flow rate will also be influenced by the clay to oil ratio. The percentage of oil recovered from the reclaimer will vary from 50 to 95 or more pct of the oil charged, depending upon reclaimer design, condition of the oil, amount of clay used per gallon of oil, and method of operation.

Advantages of using high temperature clay-type reclaimers are:

(1) When this process is applied to straight mineral oils, and properly carried out, it is generally possible to produce a reclaimed oil having physical tests approximating those of the original product. This does not imply that reclaimed oil is equivalent to new oil in actual service.

(2) While the reclaimed oil is not as satisfactory as the original oil, this is partially compensated for by the fact that where reclaiming units are installed, the oil is generally changed and reclaimed more frequently so that the average oil condition is maintained at a reasonably good standard. Addition of new oil as make-up also improves the quality of the reclaimed oil.

Disadvantages of this type of process are:

(1) Quality of reclaimed oil is not as good as new oil from performance point of view.

(2) In small installations where the amount of oil involved is small, or even in larger installations where the oil is not rapidly contaminated or oxidized, the high first cost of the reclaiming equipment may not be justified. Also operating costs, including cost of clay and extra manpower, may not be warranted. In such instances more economical lubrication can be obtained by periodic oil change.

(3) More highly skilled personnel are required to properly handle reclaiming of used oil than are necessary for changing oil.

(4) The reclaiming process cannot be applied to oils containing additives unless use can be found for the reclaimed oil in applications where the presence of additives is unnecessary.

Reclaiming of Oil by Chemical Treatment

The reclaiming of oil by chemical treatment is generally carried out in connection with clay treatment by either of the following methods: (1) Treatment with alkaline or caustic solutions; (2) acid treatment followed by caustic or clay neutralization.

As these two chemical treatments are both used in the refining of new oil, it is to be expected that better reclaimed products can be produced than from other methods of oil purification and reclaiming. The procedures, however, are much more complex and trained personnel are required. Also, experimentation is generally required to determine suitable operating conditions for the treatments.

Due to the complex nature of these two processes, it is impossible to outline definite procedures to be followed. Wide variations exist in the type and condition of used lubricants to be handled, and the proper treatment of particular batches of oil must be considered individually to obtain best results. Since additive materials are removed by these processes, they should never be used for the reclaiming of additive oils unless use can be found for the reclaimed oil where presence of additives is unnecessary.

Treatment with Alkaline or Caustic Solutions

Generally the oil is heated to about 150° F and mixed thoroughly with 10 pct alkaline solution for a considerable period of time in order to get satisfactory contact. Following this, the mixture is allowed to settle and the caustic solution and solids are drawn off at the tank bottom. The oil is then washed with water until the water appears clear when it is drawn off. To insure thorough washing, the wash water should be tested with an indicator and washing continued until the water drawn off is essentially neutral. Following the washing the oil is either filtered or centrifuged to remove the last traces of water. Sometimes it is necessary to filter the oil through absorbent clay or to redistill the oil to remove organic soaps

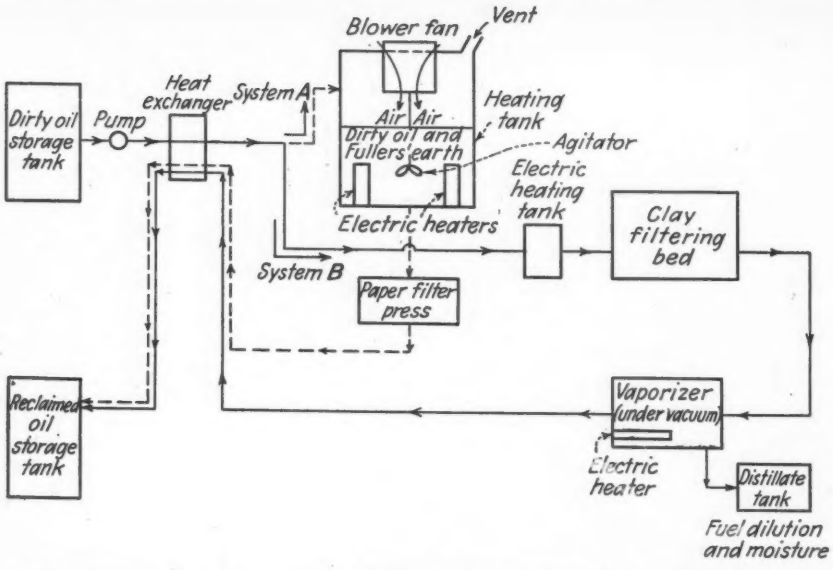


FIG. 1—Typical steps in reclaiming used oils. System A (broken line) is a clay contact method, while system B (solid line) is a percolation and vacuum vaporization method.

which are oil soluble. Partial or complete distillation is necessary if products of dilution are to be removed.

Treatment With Acid Followed by Caustic Or Clay Neutralization

The oil is allowed to rest in a storage tank to promote settling of insoluble matter. The settled oil is then mixed with acid (dilute sulfuric acid normally about 10 pct) at a suitable temperature and the acid sludge is settled and drawn off. Further treatment is necessary to remove the last traces of acidic components. If these materials are inorganic in nature, clay treatment alone will generally remove them. If organic acids are present in appreciable amounts, it may be necessary to caustic wash the oil to convert them into soaps, which can be removed by subsequent clay filtration. After clay treatment, some method of separating the clay from the oil, such as filtering, must be employed.

Using this procedure oil may be treated with acid in a single or in several steps. Multiple step treatment is preferred because temperatures are more easily controlled and any water present in the oil is removed by the first batch of acid and thus does not dilute the subsequent acid batches thereby impairing their reclaiming powers. When multiple step treatment is used, the acid sludge is drawn off before each acid addition.

Some of the disadvantages to reclaiming used oils through chemical treatment are: (1) Treatment has to be carried out by personnel well acquainted with the subject under the supervision of qualified technicians; (2) experimentation is necessary to determine the proper concentration of acid and temperature of operation to give best results; (3) emulsion troubles may be encountered, especially with heavy oils, highly oxidized oils, or those containing additives; (4) treatment losses are usually high; (5) process is uneconomical unless carried out on large volumes of oil, and (6) additives are removed from heavy-duty oils.

Chemical treatment of used lubricating oil is perhaps the best method for reclaiming when proper equipment and suitable personnel are available.

A comparison of purification, filtration and reclamation methods is given in table I. Fig. 1 shows the procedure followed in normal reclaiming of used oils.

A most important consideration, and one which must not be overlooked when selecting a method for extending the useful life of an oil, is that the oil after purification, filtration or reclamation must still be able to satisfactorily perform the function for which the new oil was designed and recommended. A close check by laboratory inspection, or established routine of operation, should therefore be maintained, once it has been established that a selected method of procedure will give satisfactory performance.

TABLE I

Comparison of Purification, Filtration and Reclamation Methods

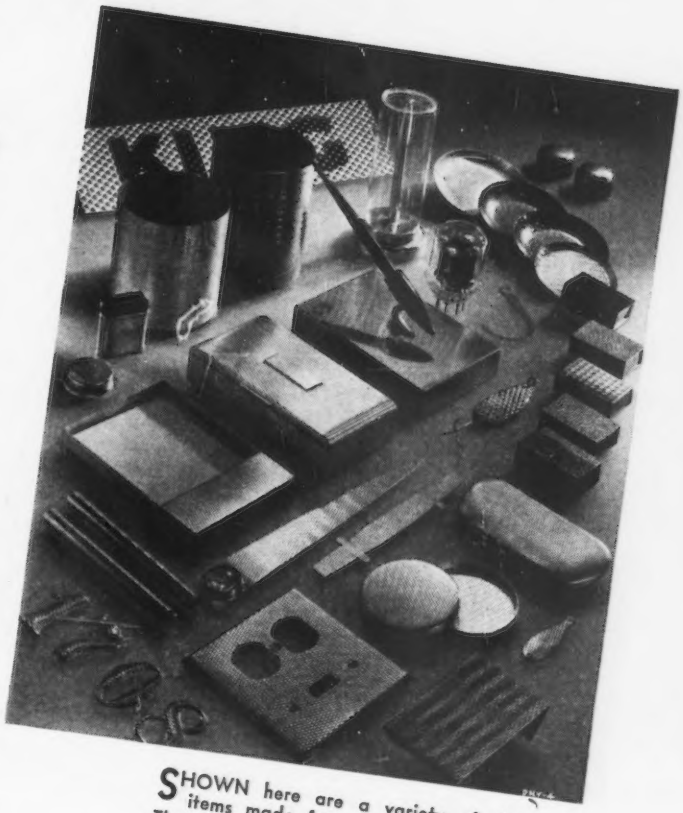
	GRAVITY PURIFICATION			FILTRATION			RECLAMATION	
	Gravity Settling	Centrifuging Dry	Centrifuging Wet	Mechanical Filters	Absorption Filters	Adsorption Filters	Clay-Type Reclaimers	Chemical Treatment
Filtering media	....	....	....	Inactive	Inactive	Active	Active	Active
Application to systems								
Full-flow	No	No	No	Yes	Not generally	Not generally	No	No
Bypass	No	Yes	Yes	Yes	Yes	Yes	Sometimes	No
Batch	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Contaminants removed								
Insoluble solids								
Large particle size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Small particle size	No	Some[1]	Most	No	Yes	Yes	Yes	Yes
Insoluble oxidation products								
Agglomerated	Some	Most	Yes	Some[2]	Yes	Yes	Yes	Yes
Dispersed	No	No	Some	No	Some	Yes	Yes	Yes
Soluble oxidation products	No	No	No	No	No	Most[3]	Yes	Yes
Water and water soluble materials	Yes	Yes	Yes	No	Some	Some	Yes	Yes
Removal of oil additives	No	No	Some[4]	No	No	Some[5]	Yes	Yes

[1] Providing gravity heavier than oil, [2] Depending upon size of agglomerates, [3] Depending upon type of media, [4] Only those which are water sensitive, [5] Depending upon type of additive.

Rigidized Metal Offers New Design Possibilities

BY ROLLING a geometrical design into sheet metals, such as aluminum or other nonferrous metals, stainless, or plain carbon steel, Rigid-Tex Corp., Buffalo, has developed a sheet product that is both decorative and functional. Its uses range from bar fronts and desk articles to diesel oil pans, truck and trailer sidings, kick plates, and the leading edges of the B-29 bomber wings. A variety of patterns gives a choice of textured surfaces that provide useful and attractive designs. Functionally, the processing itself increases the flexural rigidity, buckling strength, yield strength, and resistance to impact deformation of the sheet metal. One particular pattern in SAE 1010 steel increased the transverse rigidity by 19.5 pct and the longitudinal rigidity by 14.2 pct. On 24ST aluminum alloy, this same pattern increased the longitudinal rigidity or resistance to deflection by 108 pct.

Various applications of rigidized metal, along with samples of the typical patterns available, are shown in the accompanying illustrations. These patterns are all rolled into the sheets by means of especially designed rolls used in a conventional type two-high mill. The greater rigidity of the finished sheet often means that the designer can utilize lighter gage metal without sacrificing strength, yet saving substantially on weight. Typical of such a weight saving was the design of an oil pan for the Sterling Viking diesel engine. Here, nearly 1000 lb in deadweight were eliminated from the original cast iron pan design by rigidized sheet welded to the engine housing. No loss in strength from the redesign was evident.



SHOWN here are a variety of decorative items made from rigidized stainless sheet. The pen barrel in the background and the plates in the vacuum tube are made of rigidized metal.

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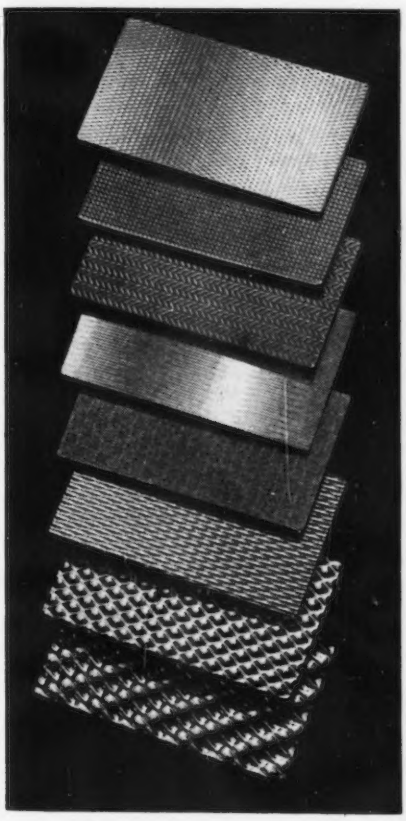

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VARIOUS designs applied by rolling to sheet by the Rigid-Tex process add both strength and beauty to the metal. The designs in the metal can also actually perforate it.

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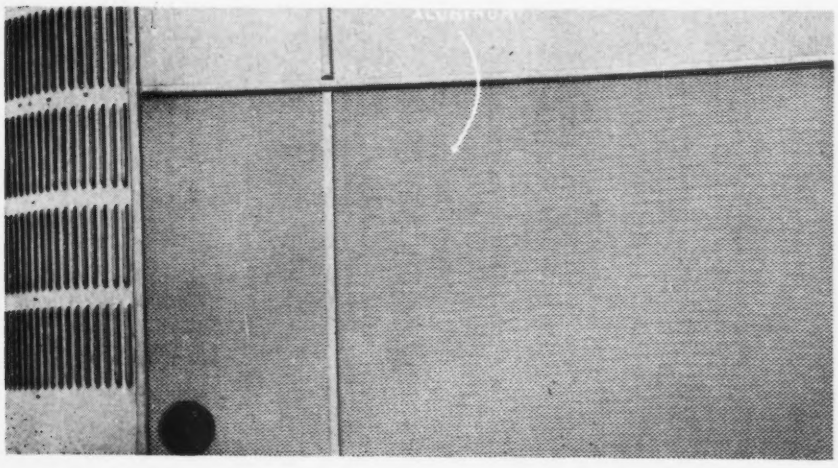
BELOW

HERE, both strength and utility are features of the rigidized aluminum siding on this Fruehauf trailer. Higher impact resistance of the patterned metal affords greater assurance against load damage.



Engineering Aspects Of The Involute Spline

By H. E. LINSLEY
Machine Tool Editor

Recently adopted as an American standard, the involute spline offers many advantages over the old style straight-side spline, both as regards structural strength and simplicity of tooling. Engineering and manufacturing aspects of this new standard spline compiled through the cooperation of the Broaching Tool Institute, Detroit, are discussed, and mathematical formulas are given for calculating the torque capacity of splined fittings.

RESULTING from the collaboration for almost 25 years of experts in many fields of engineering, the involute spline standard may be regarded as one of the most important advances in the art of fastening together machined members to prevent relative rotation. The first official release of the new American standard appeared in the 1946 edition of the SAE handbook, and is to be followed by an American Standard B5 to be published by the American Standards Assn. for use by all industry.

The chief objectives of this new standard are: To simplify engineering design, to achieve the maximum production economy, and to standardize on the minimum number and variety of production tools—hobs for external members and broaches for internal splines. The standard cuts across the interests of all manufacturing industries since it is applicable to motor vehicles, machine tools, aircraft, tractors, industrial machinery, and all manner of industrial drives. Within the automotive industry, in particular, it is applicable to all fittings formerly using the straight-sided spline.

To the user, the most valuable feature of the standard comes from the progression of 15 diametral pitch sizes, table I, ranging from 1/2 to 48/96 and encompassing the gamut of commercial shaft sizes from the largest industrial machinery drives to the finest splines used in aircraft and for small instruments. Discarding old practice, the standard provides for any desired number of teeth from a minimum of 6 for small shafts to as many as 50 for large shafts. Another boon to the designer is the specification of a range of dimensional tolerances on both the shaft and the bore of basic sizes, thus relieving him of the onerous task of calculating the tolerances for each application.

Production economy is the predominating keynote of the standard. Instead of the old method which provided three depths of tooth—shallow, medium, and deep—the involute spline is based entirely upon a 30° pressure angle involute with but one standard depth. Consequently, the entire range of 15 DP sizes requires but 15 standard hobs to cover all requirements. Moreover, each hob for a given DP can be used to cut all shafts within the given DP range, regardless of variations in shaft diameter and number of teeth.

In simple terms this means that the suppliers of tools now can establish a simple but complete line of standard hobs, making it possible for the users to get quicker delivery whenever new tools are required.

From the standpoint of the internal spline, the framers of the new standard had in mind the remarkable production economy of the broaching method. Since the cost of the broach depends primarily upon its diameter and length, and since the depth of the spline is a controlling factor, the standard was based upon the stub tooth form. This reduces the depth of the broaching cut and, thereby, reduces the overall length of the tool. Moreover, the product engineer is enabled to hold the length and depth of the splined member to a safe minimum without jeopardizing the strength of the component members, and accomplish this result with minimum tooling cost.

As in the case of the standardized hobs, the new method offers a marked advantage in reducing the cost of broaches for experimental jobs. The first cost of an involute spline broach is high, and usually pro-

hibitive if only a few pieces are required for an experimental run. It has been true, too, that it is almost impossible to locate a standard broach of exactly the right kind for a hurry-up job. From now on, the picture will change appreciably. Once the new standard has been generally adopted and the broaching tools standardized, it should be possible to secure a broach of exactly the right specifications for any new job from a source already using the same tool. This is particularly true of the large automotive plants where broaching is done in many departments and in different divisions.

From an engineering standpoint the involute spline, as compared with the straight-sided spline, inherently has greater possibilities for securing interchangeability between parts, so essential in mass production; the involute can be generated much more accurately; and the involute form has a tendency to maintain concentricity of mating members. These advantages combine to assure perfection of contact of splined members, leading to a more equal distribution of load-carrying functions. In transmissions for motor cars these combine to produce quietness of operation, a feature which may be of importance in many other types of drives, and one which is obtainable without added cost.

Torsional tests of plain splined shafts have indicated that their strength is equivalent to a plain shaft of slightly less than the minor diameter. In the involute splined shaft, on the other hand, tests have shown it to be the equivalent of a shaft larger than the minor diameter, indicating that with the fillet which is incorporated in the standard, the spline teeth actually add strength under fatigue loading. As a generalization, it is estimated that fittings designed for the involute spline will increase torsional strength from 25 to 40 pct for the same basic shaft sizes, depending upon the diameter of the shaft.

Involute splines are multiple keys in the general form of internal and external involute gear teeth, as used to prevent relative rotation of cylindrically fitted machine parts. Involute splines can be machined by the same methods and equipment as those customarily used in the production of gears.

The nomenclature agrees as nearly as possible with the standard gear nomenclature adopted by the American Gear Manufacturers Assn. and the American Standards Assn., except that the words root diameter, outside diameter and inside diameter have been changed to major diameter and minor diameter to avoid confusion. Fig. 1 gives symbols and definitions.

Basic dimensions for both external and internal splines are: Pitch diameter, circular pitch, circular tooth thickness, addendum, dedendum, major diameter, and minor diameter. Because of the universal practice of broaching the internal spline it has been held to

TABLE I

Tooth Dimensions and Pin Diameters for Involute Splines

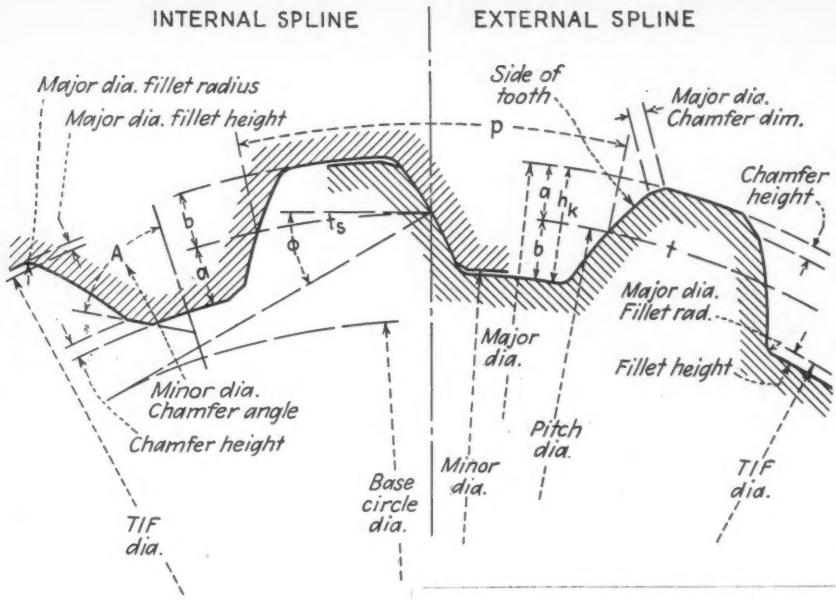
ACTUAL SIZE	DP	a b	p	t_s	t FOR CLASS A	t FOR CLASS B	t FOR CLASS C	PIN DIAM. d_x	PIN DIAM. d_m
½ Diametral Pitch Too large to illustrate	½	0.5000	3.1416	1.5728	1.5688	1.5718	1.5743	1.9200	1.4400
				1.5708	1.5668	1.5698	1.5728		
	2.5/5	0.2000	1.2566	0.6303	0.6263	0.6293	0.6318	0.7680	0.5760
				0.6283	0.6243	0.6273	0.6303		
	3/8	0.1667	1.0472	0.5256	0.5296	0.5246	0.5271	0.6400	0.4800
				0.5236	0.5196	0.5226	0.5256		
	4/8	0.1250	0.7854	0.3947	0.3907	0.3937	0.3962	0.4800	0.3600
				0.3927	0.3887	0.3917	0.3947		
	5/10	0.1000	0.6283	0.3157	0.3127	0.3147	0.3172	0.3840	0.2880
				0.3142	0.3112	0.3132	0.3157		
	6/12	0.0833	0.5236	0.2633	0.2603	0.2623	0.2648	0.3200	0.2400
				0.2618	0.2588	0.2608	0.2633		
	8/16	0.0625	0.3927	0.1978	0.1948	0.1968	0.1993	0.2400	0.1800
				0.1963	0.1933	0.1953	0.1978		
	10/20	0.0500	0.3142	0.1581	0.1561	0.1576	0.1596	0.1920	0.1440
				0.1571	0.1546	0.1561	0.1581		
	12/24	0.0417	0.2618	0.1319	0.1299	0.1314	0.1334	0.1600	0.1200
				0.1309	0.1284	0.1299	0.1319		
	16/32	0.0313	0.1963	0.0992	0.0972	0.0987	0.1007	0.1200	0.0900
				0.0982	0.0957	0.0972	0.0992		
	20/40	0.0250	0.1571	0.0795	0.0775	0.0790	0.0810	0.0960	0.0720
				0.0785	0.0760	0.0775	0.0795		
	24/48	0.0208	0.1309	0.0664	0.0644	0.0654	0.0674	0.0800	0.0600
				0.0654	0.0634	0.0644	0.0664		
	32/64	0.0156	0.0982	0.0501	0.0481	0.0491	0.0511	0.0600	0.0450
				0.0491	0.0471	0.0481	0.0501		
	40/80	0.0125	0.0785	0.0403	0.0383	0.0393	0.0413	0.0480	0.0360
				0.0393	0.0373	0.0383	0.0403		
	48/96	0.0104	0.0654	0.0337	0.0317	0.0327	0.0347	0.0400	0.0300
				0.0327	0.0307	0.0317	0.0337		

Note:—Italic dimensions are basic.

TABLE II

Reference Guide for Various Types of Fits

Type	Major Diameter	Sides of Teeth	Minor Diameter
Class of fit.....	Sliding I Close II Press III	Sliding A Close B Press C	Sliding X Close Y Press Z



DP-Diametral pitch
p-Circular pitch
a-Addendum
b-Dedendum
h_k-Working depth
c-Clearance
t-Circular tooth thickness
t_s-Circular space width
ϕ-Pressure angle

C-Measurement over pins-external
G-Measurement between pins-internal

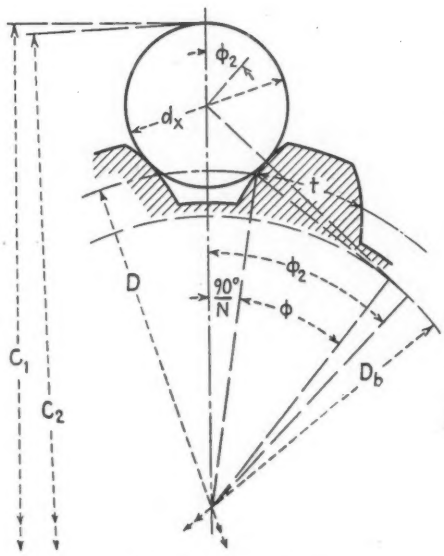
N-Number of teeth
D-Pitch diameter
D_b-Base circle diameter
D_o-Major diameter
D_R-Minor diameter
TIF-Diameter at junction of involute form with fillet
d_x-Measuring pin dia-external
d_n-Measuring pin dia-internal

ABOVE

FIG. 1—Nomenclature for involute splines adopted by ASA agrees as nearly as possible with that adopted for gears except that "major and minor diameter" replace "root, outside and inside diameter."

basic dimensions, and the external spline dimensions varied to control the fit. This corresponds to the general practice of fitting to a reamed or drilled hole, because of the fixed condition of the finishing tools and gages.

Tooth thickness is determined by measuring over pins for the external, and between pins, for the internal splines. The diameter of the pin is optional within a narrow range. It is not necessary that a pin contact exactly at the pitch circle. For the sake of uniformity and to follow a satisfactory practice, this standard incorporates a recommended diameter indicated at the top of each table. Measurements with pins will not



EXTERNAL SPLINE

ϕ = Pressure angle at D (30°)
ϕ_2 = Pressure angle at pin center
d_x = Pin diameter
D_b = Base circle diameter (D cos 30°)
t = Circular tooth thickness.

$$Inv.\phi_2 = \frac{t}{D} + inv.30° + \frac{d_x}{D_b} - \frac{\pi}{N}$$

From inv. ϕ_2 find ϕ_2 in degrees
if N is even, use

$$C_1 = \frac{D_b}{\cos\phi_2} + d_x$$

If N is odd, use

$$C_2 = \frac{D_b \cos\frac{90°}{N}}{\cos\phi_2} + d_x$$

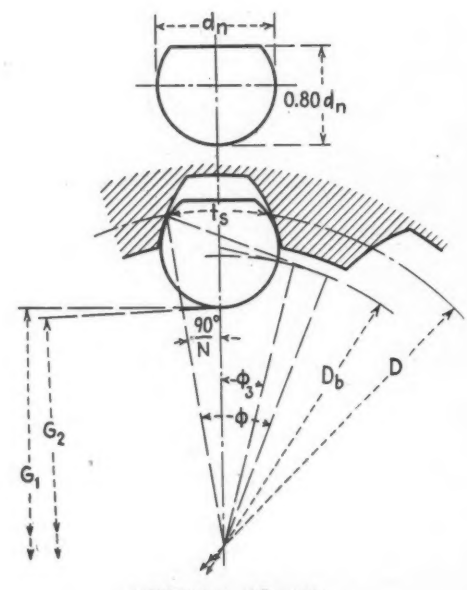
EXAMPLE

DP=10/20, N=20, $t=t_s=0.001$

$$Inv.\phi_2 = \frac{0.1561}{2.0000} + 0.053751 + 0.110851 - 0.157080$$

$=0.085573$ and $\phi_2 = 34.552°$
(Dimensions from Table IV)
and because N is even

$$C_1 = \frac{1.732051}{\cos 34.552°} + 0.1920 = 2.2950$$



INTERNAL SPLINE

ϕ_3 = Pressure angle at pin center
t_s = Circular tooth space-basic
d_n = Pin diameter (pin must be ground flat to avoid interference with major diameter)

$$Inv.\phi_3 = Inv.30° + \frac{t_s}{D} - \frac{d_n}{D_b}$$

if N is even, use

$$G_1 = \frac{D_b}{\cos\phi_3} - d_n$$

if N is odd, use

$$G_2 = \frac{D_b \cos\frac{90°}{N}}{\cos\phi_3} - d_n$$

EXAMPLE

DP=10/20, N=20, (t_s is basic)

$$Inv.\phi_3 = 0.053751 + 0.078540 - 0.083138$$

$=0.049153$, and $\phi_3 = 29.183°$
(Dimensions from Table IV)
and because N is even

$$G_1 = \frac{1.732051}{\cos 29.183°} - 0.1440 = 1.8399$$

RIGHT

FIG. 2—Method of measuring internal and external involute splines over wires.

check spacing errors and these must be determined by other means. Pins for measuring internal splines must be flattened (see fig. 2), but for external splines those chosen will clear the minor diameter.

Type of Fits

There are three accepted methods of fitting splined parts: On the major diameter; on the sides of the teeth; and on the minor diameter.

Major diameter fits are most generally used, and the fit controlled by varying the major diameter of the external splines by grinding. In addition, the broach for the internal teeth is accurately made on the major diameter.

Minor diameter fits are used where the user favors grinding the minor diameter of the internal spline to vary the fit on a shaft which is held standard. This type of fit requires special tooling.

Side bearing fits on the sides of teeth, where fit is controlled by varying the tooth thickness.

The three methods, in turn, are each divided into three classes of fits to provide for a wide range of practical design requirements—sliding, close, and press fits. Sliding fits must have clearance at all points; close fits are close at only one point, while press fits involve an interference at only one point. These methods are given in table II and are used in conjunction with table I in the SAE handbook as a key to the appropriate table of the Standards Manual.

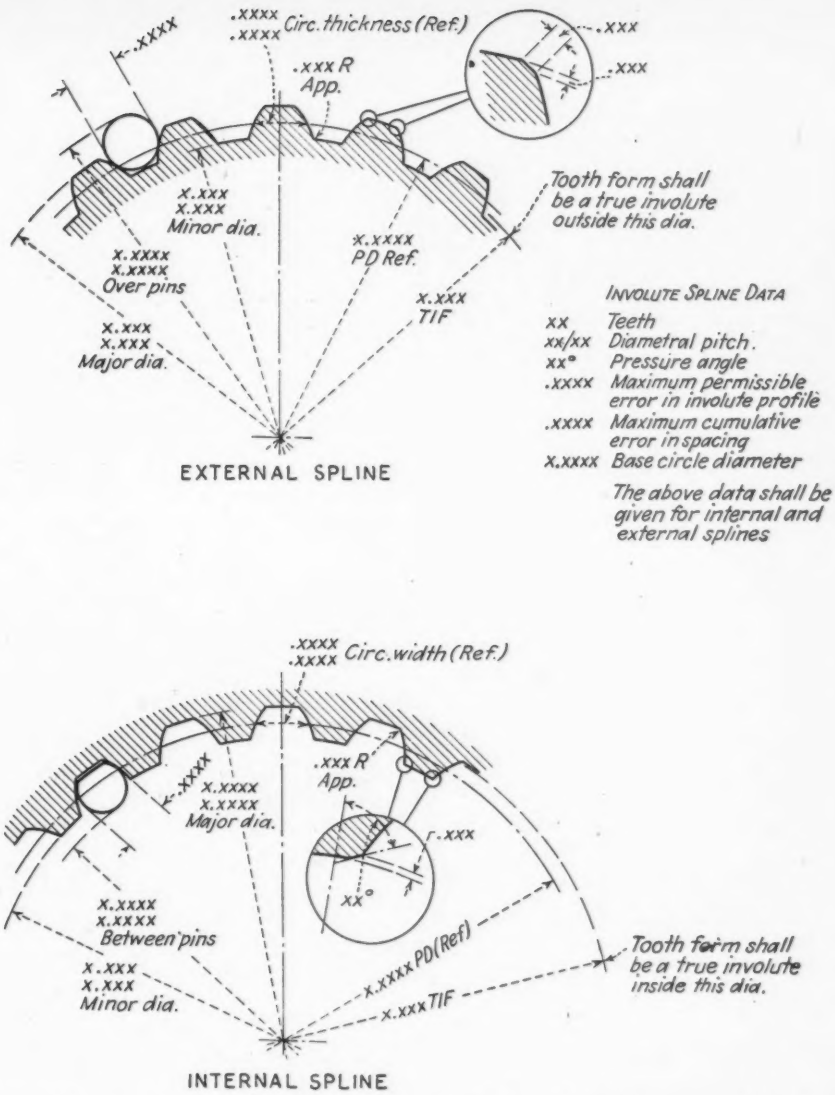


FIG. 3—Standard method of dimensioning drawings of internal and external involute splines.

The standard lists the circular clearances or interferences in the three classes mentioned in table II, and also gives the recommended tolerances for space width and tooth circular clearances. The fits and tolerances thus recommended are merely suggestions to the designer and are not considered as binding on a manufacturer unless specifically agreed upon in writing, in advance.

Because of the wide use of ball bearings on splined shafts, it will often be convenient to know the nearest size of spline for any given ball bearing bore. The standard provides for such a selection, in which the major diameters given are those nearest under the metric bore dimension. These may be used by making the major diameter as recommended by the ball bearing manufacturer, provided it does not interfere with a major diameter fit.

In adopting the standard it is important to use uniform methods for showing complete information on detail drawings. Fig. 3 shows the recommended drafting room practice for sections, dimensioning, and involute spline data.

It is of interest to note that the standard covers both the conventional flat fillet as well as the full fillet spline. While the latter has a minor diameter less than normal or flat base type, owing to the smooth large fillet, it is less liable to fatigue failure and, therefore, will safely carry the same torque as a plain shaft of slightly larger diameter. Consequently, the full fillet type has been used extensively in the aircraft engine industry.

The designer will be interested in the following summary of the advantages of involute splines, as well as a brief treatment of the calculations for the torque capacity of fittings using involute splines.

Major advantages of 30° pressure angle involute splines may be summarized as follows:

(1) Tooth has maximum strength through the minor diameter which is the critical area of the highly loaded member.

(2) Involute splines are self-centering and, therefore, tend to equalize the bearing and load-carrying stress among all the teeth.

(3) Since a smooth surface is normally obtained by the generating action of the hob, it is not necessary to grind a splined member on the involute curve.

(4) Spline length generally may be held about equal to the pitch diameter with assurance of meeting full load requirements and stability.

The torque capacity of a splined fitting can be readily calculated, for most applications, by the following formulas; using the symbols given below:

Q = Torsional moment, inch-pounds.
S_s = Allowable torsional shear stress, pounds per square inch.
S_c = Allowable compressive bearing stress, pounds per square inch.
D_I = Inside diameter of hollow shaft.
A_t = Area of one tooth in contact.
L = Length of spline, inches.
h = Height of contact on tooth = $0.8/DP$ = $0.8D/N$ (0.80 is a minimum).
D = Outside diameter of shaft.
N = Number of teeth.

The customary expression for torsional resistance of a shaft of diameter D_R is:

$$(1.6)\ Q = \frac{\pi D_R^3 S_s}{16} \text{ or } (1.6a)\ S_s = \frac{16\,Q}{\pi D_R^3}$$

Assuming that all teeth are contacting, the equation may be written,

$$Q = \frac{S_c A_t N D}{2} \text{ and since } A_t = Lh = \frac{0.8\,LD}{N} \text{ then,}$$

$$(1.7)\ Q = \frac{S_c LD^2}{2.5} \text{ or } (1.7a)\ L = \frac{2.5\,Q}{S_c D^2} \text{ or } (1.7b)\ S_c = \frac{2.5\,Q}{LD^2}$$

For shear stress at the pitch diameter (which averages for internal and external splines), the area in shear is $\frac{\pi DL}{2}$ or 1.5708 DL. Therefore the spline shear stress is

$$(1.8)\ S_s = \frac{2\,Q}{D\,(1.5708\,DL)} = \frac{1.2732\,Q}{LD^2} \text{ or } (1.8a)\ L = \frac{1.2732\,Q}{S_s D^2}$$

By dividing (1.8) by (1.7b) a ratio of S_s to S_c of 0.5093 can be obtained. Good practice dictates that the allowable shear stress be taken as 60 pct, and the allowable compressive bearing stress as 140 pct of the ultimate tensile stress, or a ratio of $\frac{60}{140}$, or 0.428. The design of splines is therefore critical in shear. By combining (1.8) and (1.6) which involve only shear stress, it is possible to obtain:

$$(2.0)\ L = .250\,\frac{D_R^3}{D^2}$$

which applies only under ideal conditions with all teeth in perfect contact. Actual practice has shown that due to inaccuracies in spacing and tooth form, the equivalent of about 25 pct of teeth contact, so that a good approximate formula for a splined solid shaft is:

$$(2.1)\ L = \frac{D_R^3}{D^2}$$

By similar combinations there can be obtained, for hollow shafts, the formulas

$$(2.2)\ L = \frac{D_R^4 - D_I^4}{4D^2 D_R}$$

, and adjusting for 25 pct contact as in (2.1), the formula becomes $(2.3)\ L = \frac{D_R^4 - D_I^4}{D^2 D_R}$

The foregoing is intended to touch briefly on the highlights of the new American standard. For a complete working knowledge of this system, refer to the tabular data and explanatory text in the 1946 SAE handbook.

Fork Trucks Feed Heavy Stocks to Automatics

FEEDING heavy bar stock to Cone automatics directly from the electric fork lift truck used to move the stock from the storage location to the machine is suggested by engineers of the Philadelphia Div. of Yale & Towne Mfg. Co. as a means of cutting costs through more effective utilization of industrial electric trucks.

Simple welded U-shaped frames, shown in fig. 1, fabricated from channel and angle iron can be used to store the bar stock in an orderly manner. This type rack also permits use of fork trucks to pick up a load without manual handling of the bars. It is reported that use of a fork truck in this manner will not mar the finish of the bars. Feeding of the bar stock to the automatics directly from the fork truck can be accomplished as illustrated in fig. 2.

FIG. 1—Welded U frames for storing bar stock permit use of fork trucks to pick up the stock without manual handling.

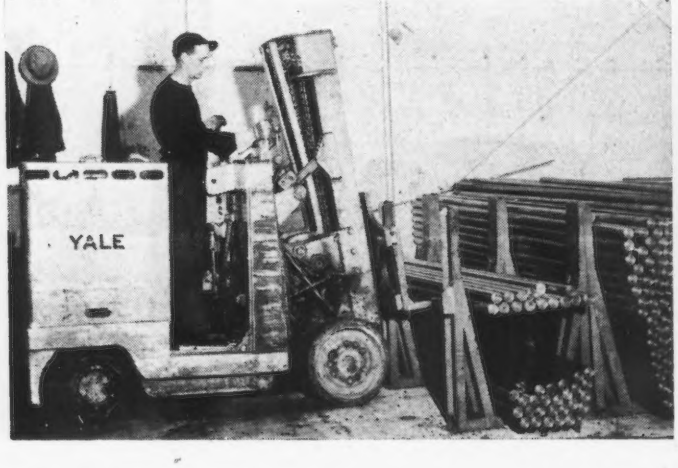


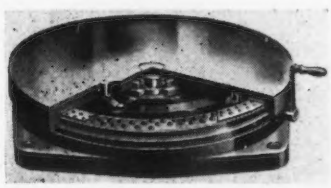
FIG. 2—Feeding bar stock to an automatic directly from a fork truck.

New Equipment . . .

Small Tools

Recent developments in indexing and dividing tables, collet chucks, end mills, rotary files and burrs, grinders and adapters, masonry drills, roll turning tools, cut-off and contact wheels are among the machine shop tools featured in this week's review. Dial indicators and a thread lead checker are also described.

1 For fast, accurate indexing on a wide variety of production operations, the *Robbins Engineering Co.*, 318 Midland Ave., Detroit 3, has announced an index table which is indexed manually and located automatically. To index, a crank handle is turned to horizontal which disengages a locking pin; as the table is indexed the handle is released and the table is locked in the next position automatically. Number and location of the index positions are determined to suit the application. A safety stop permits indexing in one direction only. A specially designed ball bearing which supports the table is said to



eliminate out-of-parallel conditions due to vertical thrust from cutting tools or heavy parts located off-center on the table. An anti-friction radial mounting produces effortless indexing and reduces operator fatigue, it is said.

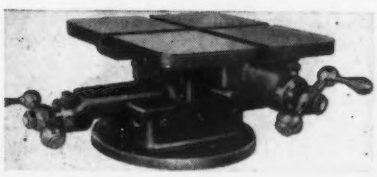
Circular Dividing Table

2 Announcement of the Rotoptic high precision circular dividing table developed by SIP of Geneva, Switzerland, has been made by *Cosa Corp.*, 405 Lexington Ave., New York 17. The table, having a working surface diameter of 3½ in. has been designed for use with Hydroptic B jig boring and milling machine and built to withstand transversal stresses due to milling work. The Rotoptic differs from the conventional dividing tables, it is said, by the fact that the worm is only used for rotating the platen, whereas angular measurements are made optically. The outer edge of the platen is graduated in 1/6ths of a degree for the initial positioning of the platen with the naked eye. Precise measurements are

made on a built-in graduated circle by means of a microscope. The platen can be rotated at 4 rpm by means of a motor contained in the base and controlled by pushbuttons.

Sliding Table

3 Built with a gaged travel of 5 in. in each direction, a small heavy-duty two-way sliding table has been introduced by *Leo G. Brown Engineering Co.*, 1127 Riverside Dr., Los Angeles 31. It has been designed for quick mounting to any drill press and its versatility is said to save many manhours of setup time on small production work in metalworking, woodwork-



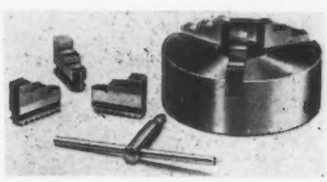
ing or machine shops. Table top is 7½ in. sq and is fitted for 1-in. T-bolt heads. It is 3¾ in. high overall and weighs 24 lb.

Quick Change Chuck

4 Said to permit quick tool changes with ease and safety without shutting off the power tool, a high-speed production chuck for drill press and hand power tools has been announced by the *Rayco Mfg. Co.*, 3911 S. Prairie Ave., Chicago 15. Utilizing the principle of centrifugal force to move a ground and hardened driver into the adapter slot, the manufacturer states that the chuck operates in all positions at any speed. Tool changes can be made in 3 sec with power tool operating anywhere in speed ranges up to 20,000 rpm, it is said. The centrifugal lock and self-centering features of the chuck permit close-tolerance precision work at high speeds.

Lathe Chuck

5 A 5U 5-in. universal lathe chuck incorporates features not found in other chucks of this size, accord-

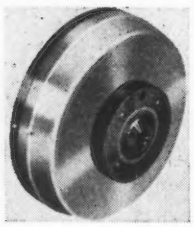


ing to the manufacturer, *Falls Products, Inc.*, Genoa, Ill. Three hardened alloy pinions have been provided to reduce wear and eliminate search time. The chuck is threaded to mount directly on all lathes with 1½ in.-8 spindle thread and can be adapter-mounted to others. Two sets of interchangeable jaws furnished for internal and external grip are made of hardened alloy steel. A 6-in. 4-jaw chuck for 1½ in.-8 spindle thread mounting is also available.

Jet-Type Collet Chuck

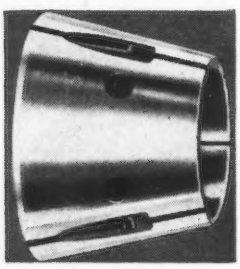
6 For use on all hand screw machines and engine lathes up to 1-in. capacity, a collet chuck, known as the Almco jet-type collet chuck, has been introduced by *Modern*

Collet & Machine Co., 401 Salliotte St., Ecorse 18, Mich. The gripping pressure of the collet is adjustable in 12 positive steps from 0 to 15,000 lb. Thus thin-walled tubing can be held without distortion, it is stated, and bar stock is held without slippage for hogging cuts up to the full horsepower of the machine. The collet is closed by spring action and is opened by a compressed air jet—100 psi line pressure, eliminating the danger of the chuck opening in case of failing air pressure. The chuck can be opened in any position if stationary, or at any speed up to the maximum speed of the fastest machines. Collets are changed from the front of the chuck and are available in all sizes to 1 in. max, round, hex and square. Overall length of the chuck including collet is 2¾ in. and the weight is 11½ lb.



Collet Chuck

7 The Levermatic collet chuck, made by *Porst Bros.*, 259 N. California Ave., Chicago 12, is said to insure a positive, straight parallel grip on the work at all times, a steadier hold through the full length of the collet bearing to compensate for work irregularities, and permits maximum spindle hold bar capacity. A knurled hand-operated selective collet adjustment ring with self-locking positions maintains a set predetermined pressure and assures a solid grip for tough steel under heavy cuts and a firm gentle grasp on thin tubing and plastics. The complete chuck threads onto the lathe spindle nose and provides both minimum overhang and runout. The chuck, which has a capacity up to 1 in., rotates and with the aid of a hand-operated shifting lever operates without stopping the spindle.



Collet Chuck

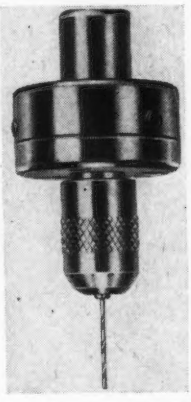
8 To speed operations on lathes, tapping, milling and other machine tools, a quick acting collet chuck has been introduced by *Goodwin Mfg. Co.*, 1743 Second Ave., Cuyahoga Falls, Ohio. The chuck through the cantilever action of the hardened steel fingers is said to provide sure, powerful gripping action. It is controlled by a short lever requiring only finger-tip force to open or close the collet. The threaded nose cap is easily removed for changing collets or pressure and locked in proper adjustment by a key which engages the spring with engraved slots on the inner surface of the adjusting collar. The chuck adapter plate is threaded to fit the spindle; it can also be supplied with straight or tapered hole to fit motor shafts.

Drill Stand

9 Developed to fill the need of the average machinist for a handy compact stand which holds frequently used drills the Geneva drill stand holds 20 of the most commonly used tap and body drills including fractional, letter and number. National distributor is the *Glenn C. Hall Co.*, 541 S. Spring St., Los Angeles 13. The stand folds compactly with drills held in place in any position and is said to fit into a small drawer of a machinist's tool kit.

Drill Chuck

10 An adjustable collet chuck known as the Micro drill chuck has been developed for adjustment of absolute concentricity to permit realignment of the drill with the drill press for greater accuracy. Built by *Chicago-Latrobe Twist Drill Works*, 411 West Ontario St., Chicago 10, the chuck is available with a small collet ranging from 0.005 to 0.025 in. and a larger size ranging from 0.020 to 0.040 in. It is stated that once the drill has been aligned with the spindle on which it will be used, it is not necessary to readjust the drill chuck when a change of drill is made.

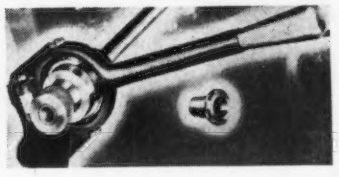


Live Center

11 Called Cent-a-matic, a precision tool designed to be placed in the head stock of either lathe or cylindrical grinder has been announced by *Acme-Danneman Co., Inc.*, 203 Lafayette St., New York 12. Model 10 eliminates the use of a lathe dog and is said to make it possible to duplicate lathe turned parts having a variation of as much as 3/32-in. depth of centering drill. Duplicate mold parts having shoulders can be accurately machined, it is reported. Model 20 has been designed expressly for grinding diameters to shoulders; center drill depths can vary as much as 3/32 in.

Lathe Drawbar

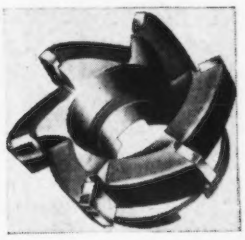
12 Three positions of tension adjustment and ease of operation where there is a slight variation in work diameter are claimed for the precision lever type drawbar manufactured by *General Die & Stamping Co.*, 262 Mott St., New York 12. Designed for production use on popular make ½-in. collet capacity lathes, positive gripping tension applied over the range of three adjustments is described as automatically adapting itself to the diameter of stock whether it is under-



size, oversize, or standard. Cam design principle is said to reduce friction to a minimum and eliminates the need for fingers.

Shell End Mills

13 Red Streak carbide tipped and Blue Streak tantung tipped shell end mills, manufactured in



right and left hand styles, ranging in size from 2½ to 4½ in. OD and bores 1 to 1½ in. have been announced by the *Vascoloy-Ramet Corp.*, North Chicago. The carbide tipped mills are available with negative radial and axial rake angles for milling steel and zero rake for milling cast iron, nonferrous and nonmetallic materials.

Die Head

14 For use on small screw and tapping machines, a solid adjustable insert chaser die head, size 000 style Sama, has been announced by *Eastern Machine Screw*

Corp., New Haven 6, Conn. Insert chasers are made of high-speed steel and are said to cut threads of exceptional quality. Their free cutting action results in long runs between grinds, it is said, even on alloy stocks. Chasers are easily removable for regrinding and resharpening. The 000 size of die head is only 1⅛ in. in diam and 1 in. long. It has a capacity up to ¼ in. diam and in pitches from 20 to 80. Chasers extend slightly beyond the face of the body for close to shoulder threading. The head is designed to fit No. 1 size holder which has a ¾-in.-24 thread.

Files and Burrs

15 A line of rotary files and ground burrs with ⅛-in. shanks used for relatively delicate operations have been announced by *Nicholson File Co.*, Providence, R. I., as supplementing their line of similar tools with ¼-in. shanks. Nine standard styles or shapes are offered in either hand cut rotary files or ground-from-solid burrs. Stock diameters of heads range in sizes from ⅛ to ⅝ in. Shanks are code stamped for easy identification. The tools can be used with portable air or electric hand tools, drill press or flexible shaft at speeds up to twice those recommended for ¼ in. shank type. Speeds are dependent on the actual diameter of the head or cut section. Eighteen files or 18 burrs are available in specially packaged cellophane covered box which acts as a handy bench stand.

Taps and Threading Tools

16 M-11, a chrome-cobalt high-speed steel developed for taps and threading tools is being used by *Detroit Tap & Tool Co.*, 8432 Butler St., Detroit, for its line of standard and special taps. M-11 steel is said to have such advantages as higher resistance to abrasion than other high-speed steels, high toughness with high hardness, resulting in less chance of tooth breakage, higher red hardness permitting efficient use of taps at drill speeds or even higher and higher torsional strength said to impart to the tap greater resistance to twisting and breakage.

Tool Grinding Arbors

17 Straight arbors for use on any tool and cutter grinder to sharpen cutting tools without changing cutter grinder footstock or tailstock position have been designed by *Covel Mfg. Co.*, Benton Harbor, Mich. Arbors are made of alloy tool steel, hardened and ground with lapped centers. Distance between centers is constant for all diameters and taper is designed to suit milling cutters. Tools have up to 6 in. width of face and are 10 in. long with 8 in. of ground surface. Standard set includes one each: 1, 1¼, and 1½-in. diam arbors in a metal box.

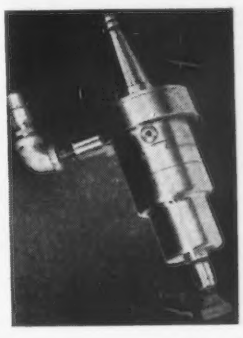
Air Grinders

18 Announcement of two air grinders, the D-325 for 8-in. wheels and the D-125 for 6-in. wheels has been made by the *Rotor Tool Co.*, 17325 Euclid Ave., Cleveland. They are suitable for such work as cleaning, grinding or snagging castings, hogging out defects in large steel castings for welding, removing fins, defects in billets, bar stock, etc., and for grinding welds and polishing sheet metal work particularly stainless steel. Outstanding features are light

weight due to use of magnesium combined with a light weight motor unit; substantially more power delivered at high load speed; and compact, simple construction, easy to service and maintain. A governor idles the machine at the permissible free speed and as soon as pressure is applied to work tending to reduce the speed, it opens quickly and positively to deliver full air at high load speed. D-325 is available with straight, spade or safety handle at speeds of 4500 rpm for 8 x 1 elastic wheels, 4100 rpm for 6 x 1 vitreous and 3100 rpm for 8 x 1 vitreous; D-125 is available in speeds of 6000 rpm for 6-in. elastic wheels, 4100 rpm for 6-in. vitreous, and may be used at 6000 rpm for 4-in. vitreous wheels.

Jig Grinder Adapter

19 Developed to convert jig borers and other machine tools into a precision jig grinder, the Vulcan-



aire is equipped with an adapter said to fit into the chuck of any machine tool. This high speed air driven attachment, manufactured by the *Vulcan Tool Co.*, 730 Lorain Ave., Dayton 10, has controllable speeds ranging from 30,000 to 75,000 rpm which are controlled by

from 4 to 8 cu ft of air per min. Precision grinding of holes from 1/16 to 1½ in. is provided for. The unit is 2½ in. in diam and, exclusive of adapter and grinding wheel, is 7½ in. long.

Masonry Drills

20 Carbide tipped masonry drills are available in a range of sizes from 3/16 to 1½ in. diam, from *Chicago-Latrobe Twist Drill Works*, 411 W. Ontario St., Chicago 10. All are furnished oversize to provide for clearance in the installation of anchors, expansion bolts, toggle bolts, etc. These rotary type masonry drills are especially designed for rapid and efficient drilling in all nonmetallic materials such as brick, cement, marble, slate, concrete, tile, stone and glass. Their rotary operation is said to eliminate the noise and hammering experienced by the old type percussion bit.

Carbide Masonry Drills

21 Seventy-five pct increase in speed over ordinary steel drills on nonmetallic materials is claimed for the Red Streak line of carbide tipped masonry drills now available from *Vascoloy-Ramet Corp.*, North Chicago. The drills are obtainable in off-set and straight shank designs in diameters of 0.198 to 1.535 in. and are provided with generous sized carbide tips. Adaptable for any rotary powered or hand drill the drills are specifically designed

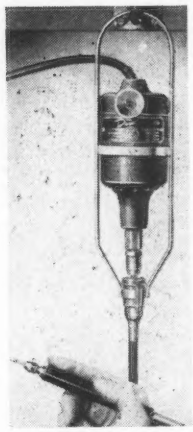
for concrete, brick, tile and slate work to eliminate premature wear, excessive drilling time and noisy percussion hammering.

Midget Grinding Wheels

22 Development of midget solid tungsten carbide grinding wheels for use in grinding holes that could not be satisfactorily finished with abrasives has been announced by *Raymac Co.*, 3729 Cass Ave., Detroit. The line has been standardized from 0.030 to 0.250 in. Advantages asserted for the use of the carbide wheels are: They completely finish holes to close tolerances; metal of any hardness can be removed, including Stellite; and the high modulus of elasticity triples the stiffness of the cutter shank permitting maximum cutting action with no distortion or tapering of holes.

Electric Handgrinder

23 Called the Duplex, an electric handgrinder has been announced by the *Dumore Co.*, Racine, Wis. It is a dual-purpose tool for use either as a straight handgrinder or with an attachment which converts it to a flexible-shaft tool. The attachment includes a bail or hanger, in which the Duplex is clamped, a 36-in. flexible shaft which chucks into the Duplex and a choice of three different handpieces. The grinder as a hand tool is available in two different kits: the standard including the Duplex and 9 different accessories and the deluxe kit having 27 accessories. A 1/14 hp motor supplies the power for this handtool. Its chuck has ¼-in. capacity and can be adapted to 3/32 and ⅛-in. shank tools with collet sleeves provided.



Precision Boring Squares

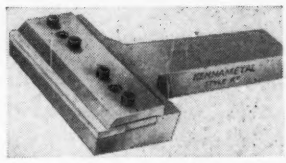
24 Solid Kennametal squares for precision boring of steel, cast iron and nonferrous metals have been announced by *Kennametal Inc.*, Latrobe, Pa. Designated style SS, the squares are supplied bottom side diamond ground with a 10° formed angle on one end. They may be ground to any desired tool point shape. Style SS tools are available from stock in grade K5H for precision boring steel parts and grade K6 for machining cast iron. Catalog sizes are: 3/16 or ¼ in. sq x 1¼ in. long; 5/16 in. sq x 1½ in. long; ⅜ in. sq x 1¾ in. long. Other grades and sizes can be supplied.

Boring Bars and Holder

25 A boring bar set and holder kit has been announced by *Bruno Tools*, Beverly Hills, Calif. The kit, designated as No. 650, consists of adustable boring bar holder No. 600 and boring bar set No. 559, packaged as a unit. The holder has a capacity of 3/16 to ¾ in. Its V-channel grip is said to be instantly adjustable and securely grips round, hex, square, and out-of-shape bars as well as drills, reamers and chucks without the use of adapters, bushings, or attachments, always holding bar or tool on exact center, it is said. The holder can be installed on any 9 or 10-in. swing lathe. Centering height is 1-3/16 in. The boring bar set consists of ¼, ⅜, and ½-in. boring bars, each with lever-lock grip which clamps the bit with equal pressure along the entire holding channel and the full diameter of the bar. Each bar has one high speed steel threading bit and one blank bit.

Roll-Turning Tools

26 Broad-nose tools for turning cast iron rolls up to 90 scleroscope have been announced by *Kennametal Inc.*, Latrobe, Pa. These roll-turning tools comprise solid Kennametal Grade K6 blades, securely held in position on an accurate surface of the supporting shank by a clamp and serrated, advanceable backup plate. The blade has four cutting edges that may



be used in succession before any sharpening is required. The long sides can be reground, the blade advanced to cutting position, until 2/3 of the Kennametal has been utilized. Tools are available in four standard cutting widths: 4, 6, 8 and 10 in.

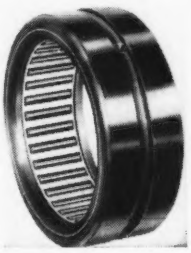
Masonry Drills

27 Improved carbide tipped Cyclone rotary drill bits for drilling concrete, brick, slate and general masonry, and a handy kit of 6 Cyclone bits have been announced by *New England Carbide Tool Co.*,

Cambridge, Mass. Deeper flutes permit the cuttings or powder residue to escape more freely from the hole making the bit freer cutting. This construction also permits larger diameter shanks and minimum overhang of carbide tip beyond the shank giving maximum support to the tip. The tip is copper brazed to the shank said to give the strongest possible bond between tip and shank. Cyclone bits may be used in hand brace, portable electric drill or drill presses.

Needle Bearings

28 The cage type needle bearing, manufactured by the *Orange Roller Bearing Co.*, 557 Main St., Orange, N. J., is said to assure permanent alignment of rollers, therefore smoother running, to provide longer life hours expectancy and less internal friction. It is especially adapted for spindles and high-speed applications, and may be used in vertical or overhung applications. Rollers run in a cage, fabricated from antifriction, nonferrous metal. All rollers, retaining rings and raceways are Pentrate finished to reduce friction, add durability and resist rust and corrosion. Rollers are square end in design for maximum effective roller lengths Internal clearances of this cage type needle bearing can be controlled to meet exacting specifications, it is stated.

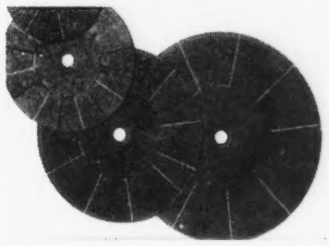


Tungsten Carbide Balls

29 Precision balls made of tungsten carbide available in any size and any desired degree of dimensional accuracy announced by *Industrial Tectonics*, Ann Arbor, Mich., possess high compressive strength in addition to hardness for applications such as special bearings and antifriction mountings, it is stated. These balls are said to be particularly useful in burnishing and polishing operations as they retain their size for a long period of time. Their hardness in combination with corrosion resistance also recommends them for use in check valves, particularly for pumping equipment. They can be furnished with holes for attachment of wires and cables for special applications such as tube drawing and bending equipment.

Cut-Off Wheel

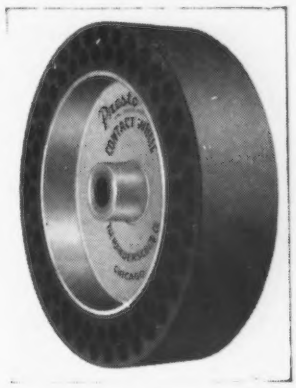
30 Designed on the same principle as the wood-cutting rip saw, the Ripper abrasive cut-off wheel made by *American Emery Wheel Works*, Richmond Sq., Providence 1, is said to cut cooler and faster.



The sides of the wheel are made with radial depressions 0.006 to 0.008 in. deep, extending from the flange area to the edge of the wheel. Manufactured in 6 to 12-in. diam sizes in grit and grade to cut all materials from steel to stone, the 6-in. wheel has minimum thickness of 1/16 in.; 3/32 in. thick are 8, 10 and 12-in. wheels.

Contact Wheel

31 Cool running qualities which permit use on semiautomatic polishing lathes feature a contact



wheel announced by the *Manderscheid Co.*, 810 Fulton St., Chicago 7. Five plys of cool-running rayon cord make the wheels suitable for semiautomatics by keeping them cool and holding their shape. Holes through the rubber give additional cooling beneath surface and produce the action which snaps the abrasive belt as it leaves the work, beating it clean with 72 hammer blows per revolution of the 14-in. wheel. Presto contact wheels are furnished in 9 and 14-in. diam with 2, 3 and 4-in. face. Diameters are uniform so that two or more wheels can be used together to produce any desired width.

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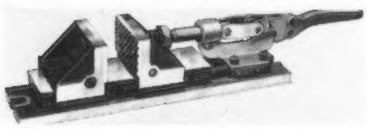
Speed Vise

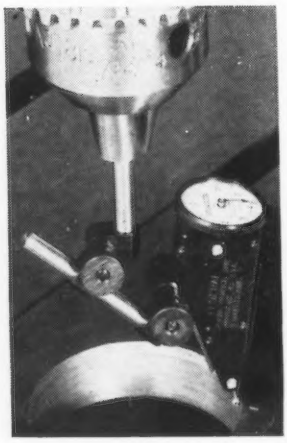
32 Called the Equi-grip speed vise, a production vise which clamps and locks through a short motion on only one lever, and which, when once set for a production part exerts the same pressure on every similar production piece, has been manufactured by the *George-Anderle Mfg. Co.*, 2116 Salem Ave., Dayton 6. Pressure is actuated by a quick-acting toggle clamp and is transmitted to the jaws through a coiled spring. Pressure is adjustable to suit the work. Both jaws are identical, but the stationary jaw is movable and replaceable so that



extra jaws with different plates or fixtures mounted on them can be used when changing operations. Jaws measure 3 in. wide.

Dial Indicators

33 Featuring a dial perpendicular to the axis of the body for improved readability and greater accuracy, four new models of the universal Testmaster dial indicator marketed by the *Federal Products Corp.*, Providence, R. I., are said to be especially adaptable for locating the workpiece on jig borers and certain drill press and milling machine applications as well as for general machine shop, tool room and inspection jobs. The indicator may be set to check a wide range of hole sizes with the dial in horizontal position, by means of dovetails, friction clamps and rods. Models 5 and 6 are graduated 0.001 and 0.0001 in. respectively while Models 7 and 8 are graduated 0.0025 mm and 0.01 mm respectively. Like the regular Federal Testmaster, the



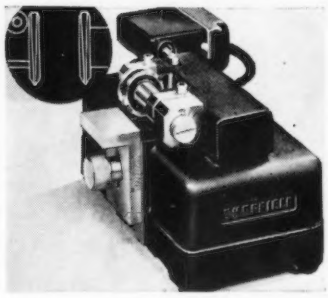
new perpendicular models have simple, direct combination of lever and crown gear movement and jeweled bearings.

Screw Drivers

34 Two power screw drivers designed for fast driving of small screws on a production basis for applications such as assembly of radio parts, electrical appliances, telephones, plastic products, etc., have been manufactured by the *Keller Tool Co.*, Grand Haven, Mich. Size 12A-1 (Model 1671) has a free speed of 2500 rpm and drives free-running machine screws up to size No. 3 and very small self-tapping and wood screws. This model is recommended for delicate screw driving operations. Size 12A-1C (Model 1672) has a free speed of 10,000 rpm and accommodates screws in the No. 3 to No. 6 range. Impacting force of the built-in clutch gives this model added drive. It is recommended for wood screws, self-tapping screws and larger machine screws. This tool has no torque adjustment.

Production Lead Checker

35 Featuring adjustable truncated cylindrical gaging anvils which are said to make possible precision checking of thread lead within a range of 4½ to 60 threads per in. to an accuracy of 0.0001 in. on production parts, the production Leadchek developed by the *Sheffield Corp.*, Dayton, has been designed for use in receiving, production and final inspection, as well as in plants and shops running small lots of a wide range of sizes. It is stated the instrument offers a flexibility to accommodate a wide diametrical range of thread work parts com-



bined with great ease of initial setup and changeover as well as rapid precise measurement of the lead. A gaging head known as Electrigage was developed in conjunction with Westinghouse to provide more accurate gaging where lead tolerances are as narrow as 0.0001 in.

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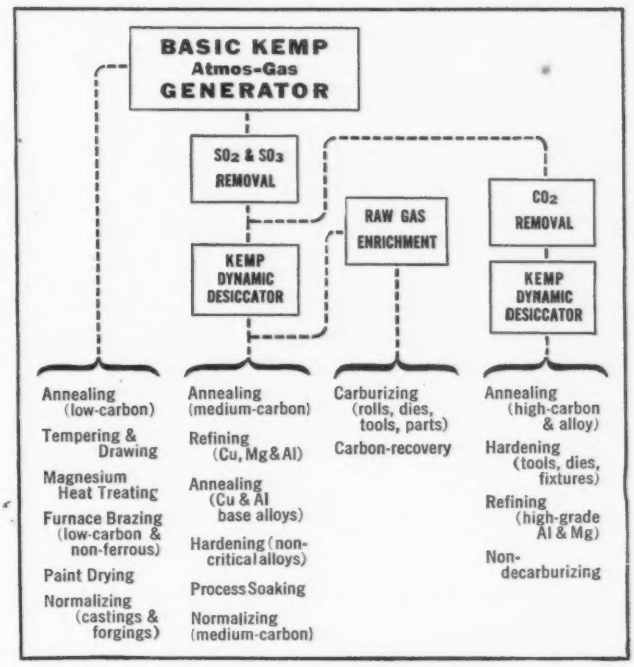

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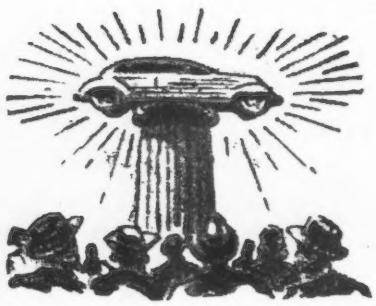
• Packard introduces its all-new postwar convertible . . . New car has no rear fenders . . . Ford is making substantial savings using new foundry methods.



DETROIT—The first "all-new postwar convertible" — the 1948 Packard Super-Eight made its debut in Detroit this week.

Members of the press who were privileged to see the hand-built model for the first time can well understand the enthusiasm of George T. Christopher, president and general manager of Packard who is making good on a promise made last fall to bring out a new postwar car early in 1947 that would be "new from the tires up."

Volume production of the new Packard convertible as a supplement to the present Clipper line is scheduled for June, Mr. Christopher explained. Inadequate supplies of materials and parts, particularly a specially built X-member frame with box section side rails and new plate reinforcement to give added stiffness and strength wil lprevent the company from reaching its production stride on the convertible until early this summer, Packard engineers explained.

The new Packard 145 hp powerplant has a number of interesting features including a 7 to 1 compression ratio (as compared with 6.7 at present), an extra heavy five bearing crankshaft weighing 104 lb and removable precision-type, sintered copper-lead bearings of a type that was used with outstanding success in the Rolls Royce aircraft engines built by Packard during World War II.

The new convertible is approximately 300 lb heavier than other Packard models and most of this extra weight, it was explained, is steel.

Engineering and tooling for the new model cost Packard $1,500,000 company officials explained and the new car has been thoroughly tested at the Packard proving grounds to determine its power, performance and economy.

Elimination of bumps and protusions is the outstanding feature of the latest Packard "flush-contour" styling. The new convertible has no rear fenders, the body itself extending over the wheels. Wraparound type bumpers of high tensile low alloy steel are used which extend almost from wheel opening to wheel opening.

"In the new convertible," Mr. Christopher explained, "the bumpers are integral parts of the car, instead of being just hung on."

The new design is reported to give better protection to the car than the present type of bumper mounting. In addition, repairs can be made in much the same manner as is now being done in most repair shops, that is by bumping and, wherever necessary, welding (a Packard official explained, that between 80 and 90 pct of damaged fenders are now being repaired rather than replaced).

THE long-established Packard radiator identity has been carefully preserved in the new model. Part of the cooling air enters through openings in the front bumper which also serves as a section of the grille. This "Refresh-Aire" System brings air into the car through a series of built-in steel ducts and permits driving in the rain with windows closed yet with adequate ventilation provided.

In the opinion of most observers this new ventilation system will be highly popular with motorists who have long objected to steamed-up windows and a lock of adequate air supply while driving in heavy rain.

The car is equipped with "pull-to" door handles. The front seat is power-operated, moving forward at the touch of a button and automatically rising to give adequate back support. Front seats swing aside to permit passengers to enter the rear compartment.

All windows move up and down at the touch of a button. Each passenger has individual control of the windows although the driver can operate all four windows from a master set of buttons at his left.

The entire top rail of the body is made of stainless steel.

The airplane-type steering wheel is made of a steel core with chrome inserts and is covered by plastic.

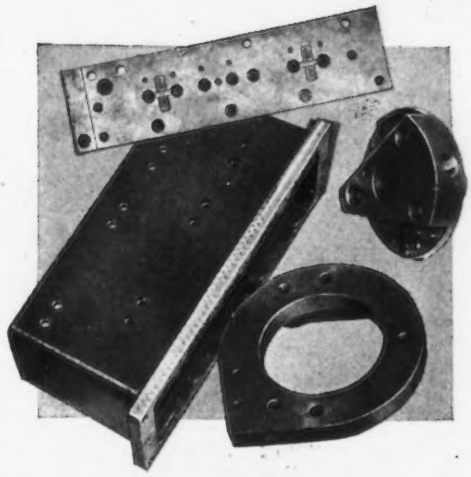
Other interior features of the Super-Eight Convertible include control keys which push—as in a push-button radio set—for both on and off. To eliminate night glare and reflections the instrument panel figures are illuminated with soft "black light."

THE upholstering is bedford cord and a war-developed plastic material that looks and feels like leather but is reported to resist cracking and to be even more durable than leather.

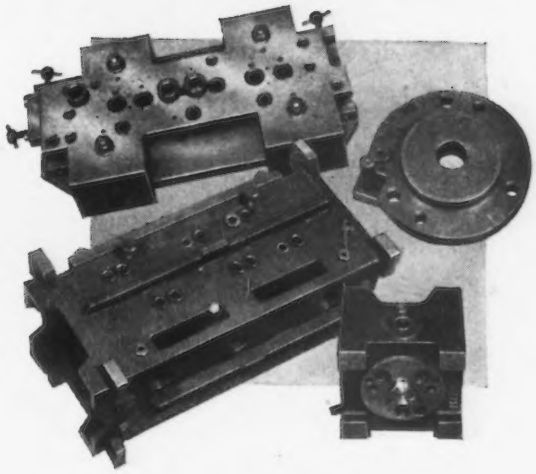
The top of the Packard convertible can be raised or lowered in a few seconds at the touch of a button, a far-cry from the 1909 days when motor car producers laid great stress on the fact that their cars were equipped with that latest of all motor car conveniences —the "one-man top."

Packard engineers report that the new engine has been tested at "consistent speeds from 75 to 80 mph for the equivalent of a year's normal mileage." The engine delivers ½ hp into each of its 327 cu in. which is said to be the most horsepower per pound of comparable weight for any car in the industry.

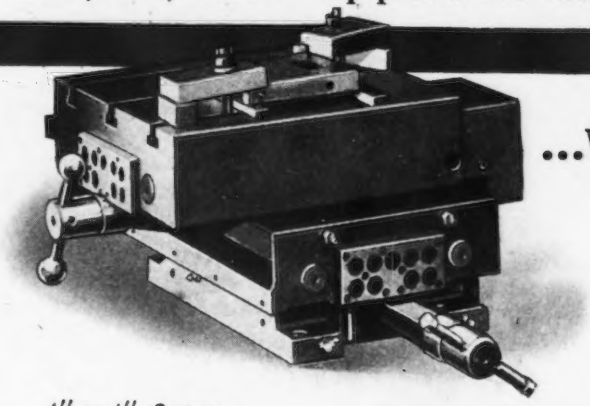
Through unique valve design and positioning of the intake manifold, the new Packard powerplant is reported to give greatly improved acceleration. New crankcase



Drill, bore, ream or tap pieces like these



. . . eliminate jigs like these



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4" x 4" Spacer for use with smaller sensitive drills.

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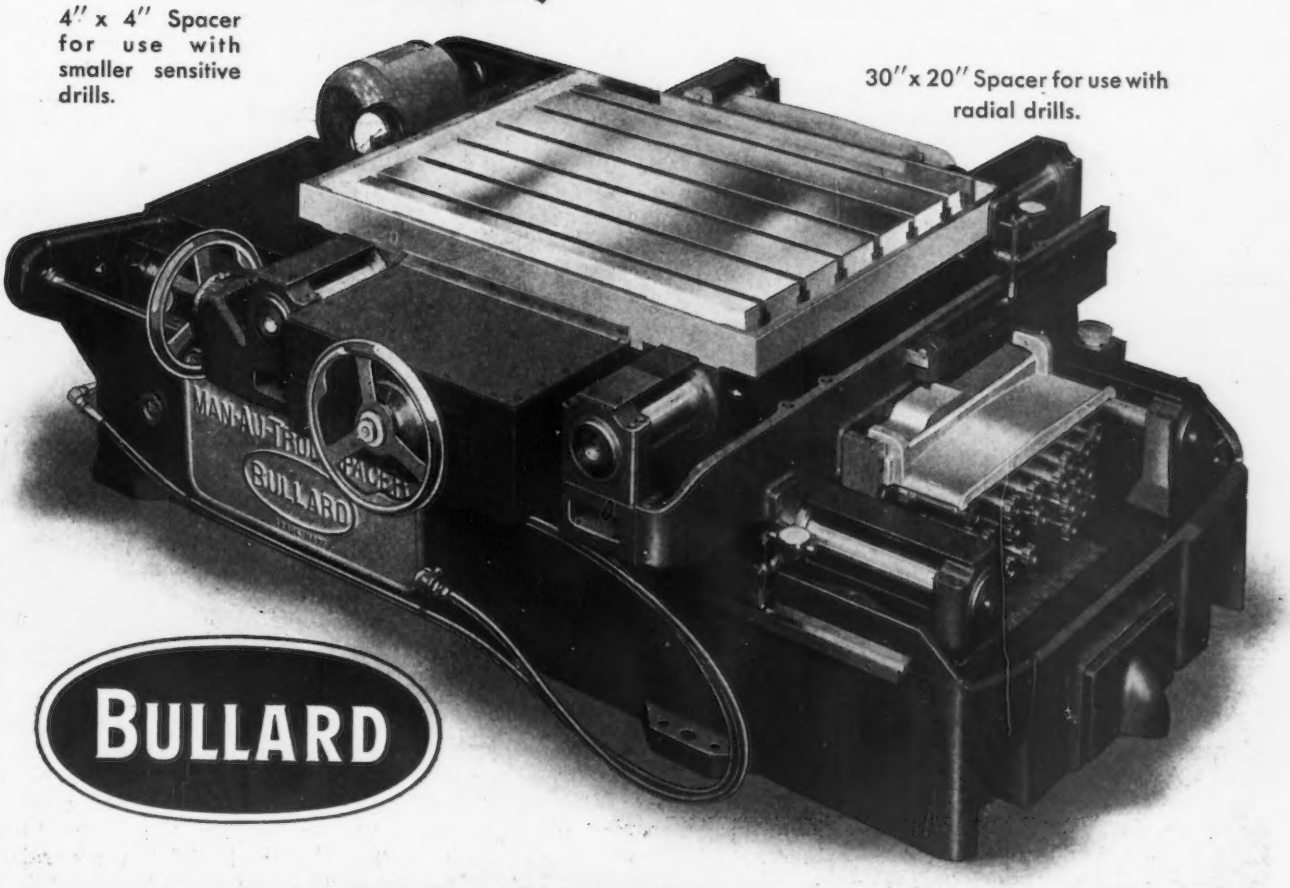

BULLARD

BULLARD CREATES ***NEW METHODS*** TO MAKE MACHINES DO MORE

ventilation is said to virtually eliminate sludge. Measurements of the bore and stroke are 3½ x 4¼ in. respectively.

The new L-head, eight cylinders in line engine uses aluminum alloy, steel strut pistons with coil-spring-expanded oil control rings. Brake horsepower at 3600 rpm is 145. Five precision-type main and connecting rod bearings are used. The engine rests on three-point rubber mountings.

The cooling system utilizes a four-blade, 18 in. fan with the water pump permanently sealed and greased.

Clutch is a semicentrifugal single dry plate type with ball throwout bearings and is permanently lubricated.

The Packard transmission has synchronized helically-cut carburized gears. Nine ball and roller bearings are used in the Packard "Unimesh" transmission.

Mr. Christopher explained with some emphasis that the Super-Eight Convertible would not be introduced with automatic transmission "because it hasn't been developed to our full satisfaction—and Packard will never use the motoring public as a guinea pig."

UTILIZING the cooling capacity of the continuous conveyor hangers on which Ford crankshafts are poured in groups of four, the Ford Motor Co. is now able to produce stronger crankshafts, eliminate use of chills in each crankshaft mold and effect a substantial savings in manufacturing costs.

Since metal dissipates heat at a rate approximately 30 times faster than the corresponding sand core, four metal blocks are welded to the hangers and serve as a base for the vertical molds. This promotes progressive cooling of the metal from the bottom up.

Where chills were formerly used, the inserts became an integral part of the crankshaft. However, when fusing was not complete or where moisture or foreign material adhered to the metal, according to Ford metallurgists gas pockets, porosity and consequent structural weakness sometimes resulted.

In addition to its other benefits, the new Ford foundry technique has reduced its drill breaking by approximately 75 pct. The high breakage was formerly encountered when penetrating the softer "chill" insert when drilling oil holes through the number one crankshaft and crank-pin bearing.

Ford is also using a new automatic core dipping and spinning unit in the production of V-8 cylinder blocks. Until recently each section of the core was dipped separately and dried in the core oven separately. These were later assembled as a complete unit. With the new equipment the assembled core is handled as a complete unit, eliminating the possibility of open spaces between the joined sections and also reducing the likelihood of sand from the cores getting into the molten metal.

This operation is part of the new $3 million core room which is now going into production on V-8 cylinder jacket cores.

AMA Warning

Detroit

• • • **The Automobile Manufacturers Assn. has warned motorists not to attempt to use petroleum-base hydraulic and recoil fluid now being sold as surplus by the War Assets Adm. in the brake system of their cars.**

Use of the fluid in automotive braking systems will cause serious deterioration of rubber parts according to automotive engineers.

Engineers are recommending nonpetroleum base fluids only for this purpose in motor cars. Motorists should check service stations and garages to be certain non petroleum-base fluid is used in servicing their vehicles. It is estimated that 8 million gal of the surplus fluid are up for sale.

General Motors Reports Its Net Income in 1946 Declined to $87 Million

Detroit

• • • **Net income of** $87,526,311 has been reported by General Motors in 1946 in its annual report to stockholders. This is at the rate of $1.76 per share on its common stock for 1946 and compares with $188,268,115 for 1945 or $4.07 per share.

Net federal tax carryback credit contributing to the profit was $44,226,228. Comparison of reports for the year and 9 months ended September indicate an operating profit for General Motors in excess of $110 million for the last 3 months of the year.

Net sales of General Motors products for 1946 totaled $1,962,502,289 as compared with $2,436,800,977 in 1941 which included $406,149,273 of war materials.

Total dividends to stockholders in 1946 of $108,941,081 represented an excess of dividends over net income of $21,414,770.

GM expenditures for addition to and improvements of plant and equipment exclusive of special tools, amounted to $287,556,942 in 1946, the report said. At the end of the year, about 30 pct of the postwar plant construction program remained to be completed, excluding certain projects which have been deferred.

For the year 1946 General Motors passenger car sales were 38 pct of the industry total for the year. For the fourth quarter alone the percentage was 47 pct, which compares with 48 pct for the year 1941. Chevrolet and GMC truck sales were 32 pct of the industry total.

EXIT FENDERS: *One of the year's new cars is this Packard convertible Clipper with 145-hp engine, built in bumpers, and no fenders. A new gadget is push button window control of all four windows from the driver's seat, in addition to individual control on each window.*

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Washington . . .

L. W. MOFFETT

• Basic metal prices have not risen unduly . . . Commerce Dept. also predicts declines this year . . . Increased production and price resistance seen as keys.

WASHINGTON — The general price structure of the iron, steel, nonferrous metals and industrial chemical industries has been given a clean bill of health by the Commerce Dept. in its recently completed study of the nation's commodity prices and trends. Overall prices in these industries, the report indicated, have neither risen unduly since dropping of price controls nor are they out of line in respect to their relationship to general price trends.

In an analysis of wholesale price changes of 675 commodities as reported by the Bureau of Labor Statistics for the last half of 1946, it was found that while about 60 pct of the items were registering price increases ranging from 5 to 50 pct, there was little or no change in the prices of 150 other commodities, largely in the metals and chemicals groups.

It goes on to say that while the average prices in eight commodity groups "are at the present time significantly above the level indicated by past relationships to the general price level . . . prices of such important groups as iron and steel and their products, nonferrous metals, furniture and industrial chemicals as a group were found to be fairly well in line with the movement of the all-commodity price index."

A number of interesting conclusions have been drawn by the Department from this comprehensive study and analysis of current price structures in general, made under the direction of its Office of Business Economics. The study itself was directed towards finding out if possible what is likely to happen to the general price levels in 1947, which if any prices are generally out of line with price movements in general, and if prices have been increased in extraordinary amounts during and since the war.

On the whole, although its conclusions are qualified with many ifs and buts, the Department is generally optimistic of the coming months, a somewhat decided reversal of its view of several months ago. It expects to see a number of changes in price factors with a resulting revision of prices in a number of lines, most of them changes for the better from the consumer's viewpoint.

FOUR basic factors are recognized by the Department as having contributed to zooming prices following the elimination of price controls. In the case of some firms or producers, the higher prices were necessary to cover rising production costs; added to this was the fact that scarcities brought on by the war had not only drained the counters but the shelves as well. Attempts to replenish inventories inevitably resulted in withholding a certain percentage of manufacturing output thereby preventing full production reaching the consumer immediately.

A third factor was that production of many items was low in relation to demand and in those instances where they are relatively flexible, prices advanced rapidly. And, finally, since many consumer durables were not available in quantities, more than the normal percentage of incomes and resources went into the procurement of the more available nondurables and thus directly attributed to the upward pressures on prices for such items as food and clothing.

As the Department economists see it, the total output of finished goods is constantly increasing and should continue to do so by reason of adding new capacity as well as greater efficiency in operations. Likewise, it is pointed out that business inventories have been increasing in book value at the rate of $1 billion a month since the middle of 1946 and that this factor is resulting in a more balanced inventory position which should permit an increased flow of total finished goods to the consumer. Manufacturers' inventories stood at a new high of $20 billion on Feb. 1.

AS to prices, durable goods are seen as coming into the markets in increasing quantities, thus causing the nondurable commodities to run into competition not generally encountered during 1946. There are indications, too, that the consumer as a whole is not now inclined to dip very deeply into his reserves as the delayed durables hit the market. There is also seen a development of the use of credit or installment buying for these durable items, thus by spreading income over a longer period still another pressure is added against the existing prices of nondurables.

An interesting portion of the report deals with the relationship of selected groups of commodities to the price structure as a whole —that is, their behavior during periods of generally rising or falling prices. In order to get a broad picture, the relationship of wholesale prices of major commodity groups to the overall price levels has been figured out on the basis of BLS price records from 1921 through the middle of 1946, at which time price controls began to be scrapped at an accelerated rate.

For a few groups such as automobile tires and tubes, the analysts could find little rhyme or reason for price movements

Automatic Pilot

CINCINNATI

GUIDES FOUR CUTTERS

to automatically profile mill four parts in one cycle

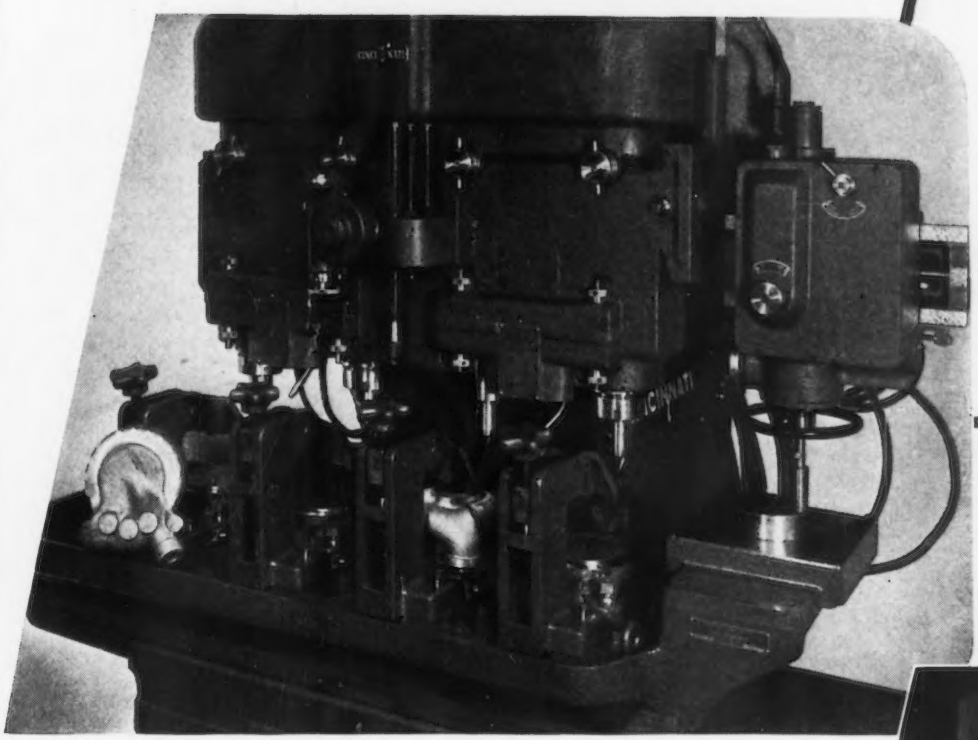
Part Name —Distributor housing (illustrated above) (Milled surface in color)

Material —Aluminum

Operation —Rough and Finish profile mill pad

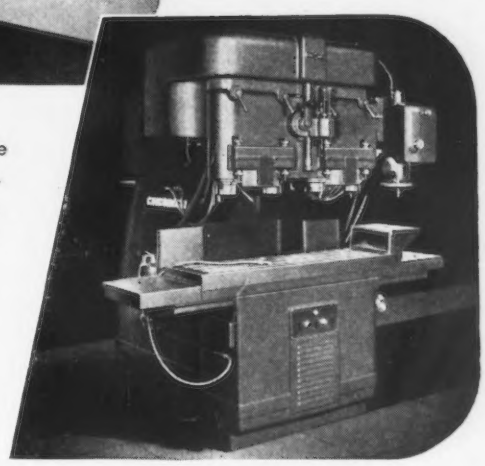
Production —32 per hour

Machine —CINCINNATI Four-Spindle 360° Automatic Profiler



Left: A CINCINNATI Four-Spindle 360° Automatic Profiling Machine set up for profile milling four distributor housing pads in one cycle. No. 2 fixture has been loaded, others show construction.

● The automatic pilot in an airplane has a wingless counterpart in the automatic profiling unit on CINCINNATI Four-Spindle 360° Automatic Profiler. Whether the profile to be milled is circular, reverse curves like the letter "S", or radial fingers like those on a clutch plate, the profiling unit (to the right of the machine) automatically scans the outline of a template, and the cutters follow exactly the same path. The operator does not guide or control the machine during the cutting cycle, yet he has complete manual control. ¶The machine above was tooled up by Cincinnati Application Engineers to profile mill the semicircular pad on distributor housings. Four parts are milled at one time. The operator loads and unloads the fixture and adjusts the cutters to the work, and then the automatic profiling unit takes over. ¶Perhaps your profile milling jobs could be performed at a substantial saving on CINCINNATI Four-Spindle 360° Automatic Profilers. Our Application Engineers will help study your problem.



CINCINNATI Four-Spindle 360° Automatic Profiling Machine for internal and external profile milling operations. Catalog M-1215 contains complete specifications.

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throughout the entire period, or at least none that could be reconciled or tied in with the general commodity price levels. It was found, however, that 31 types of commodities under ten general classifications did have a definite ratio of reaction to overall price trends.

FOR example, a change of 10 points in the overall price level can be expected to bring about a change of 7 points in the average price of metals and metals products as an industry, and 11 points for nonferrous metals, 6 points for iron and steel, 3 points for agricultural machinery and 9 points for motor vehicles as specific commodities.

Using this relationship as a standard, a number of commodities were under wholesale indictment as to inflationary price trends. The study declared that in February 1947 the price index had mounted to a position all out of proportion to normal relationship to general price levels, listing meats (31 points above normal), paints and paints materials (30 points), lumber (24 points), drugs (18 points), and footwear (16 points) as the leading offenders. The analysis states that as of February 1947:

"Prices of most other major groups of commodities were either in line with their past relationship to all prices or were not sufficiently above or below the relationship as to be out of line with past deviations. . . . The prices of such important groups of commodities as iron and steel and their products (0), nonferrous metals (—10), industrial chemicals as a group (+3), plumbing and heating (—6), agricultural machinery (+1), and motor vehicles (—2) were fairly well in line with their past relationship to the movement of the all-commodity price index."

It is worth noting that these indexes do not reflect the more recent inflationary tendencies of the steel market as a result of the runaway scrap prices and development of a so-called black market in steel.

WAR Assets Administration, which normally has more than its share of headaches, frequently finds itself having to assume extra-curricular duties. One of the most recent was taking up the role of unofficial labor relations counsel following the sale of a radio tube plant at Bowling Green, Ky.

At the root of the matter was the fact that the factory had been under interim leases to the General Electric Co. which had an unexpired union contract with its workers. Obviously, the sale of the facilities to the Electra-Voice Corp., which had the effect of terminating the labor contract, caused no little concern to the 1100 employees involved.

In an attempt to prevent possible misunderstanding and perhaps prolonged unemployment, WAA somewhat gingerly stepped into the breach and arranged a meeting between the new owners, employee representatives and labor officials. Much to the relief of the pseudo-conciliator, an agreement was quickly reached by which the new operators not only will maintain the existing contract but will consider other proposed benefits to its workers.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

FUNNY HOW A GUY WILL WEAR RUN-DOWN HEELS AN' STUFF TO WORK IN THAT MAKES HIM A CRIPPLE -- BUT, BOY, TO PLAY IN, TH' BEST-- THE VERY BEST!
I'VE SEEN A HUNNERT GUYS STOP TO TAKE NAILS OUTA SHOES HERE -- BUT NEVER IN A DANCE HALL!
WORK CLOTHES
4-4
J.R.WILLIAMS
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WAA Sells Surplus War Facilities for $1.6 Million

Washington

• • • **Sale of surplus** war plant facilities for $1.6 million have been announced by WAA, including the disposal of a high octane gasoline refinery at Coffeyville, Kan.

Built to produce 100-octane aviation gasoline, the refinery was sold to its wartime operator, the Cooperative Refinery Assn. for $1.2 million, exclusive of a great deal of personal property. WAA said that much of the plant is unsuited to peacetime production and that a substantial portion of the plant will be salvaged.

A gas welding plant in Dundalk, near Baltimore, Md., originally costing $436,000, has been sold to the wartime operator, Reid-Avery Co., Inc., for $277,000.

Daybrook Hydraulic Corp. has purchased $120,000 worth of government-built additions to its Bowling Green, Ohio, plant for $75,000. Under lease to the corporation since the war, the facilities have been producing hydraulic dump truck bodies.

A Beaver Falls, Pa., steam plant, built as an addition to the Babcock & Wilcox Co., steel plant, has been sold to the company for $55,000.

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Finish-Ground . . . *ready to go.*

STEP UP ALL YOUR SMALL BORING JOBS

With these Standard CARBOLOY boring tools

★ **FOR ECONOMY**

★ **FOR PRECISION**

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Tipped and Solid Carboloy Blank. You quickly grind to *Desired Shape.*

—put these Carboloy Tools to work on all your small boring jobs. Complete standard line of Carboloy-tipped finish-ground boring tools covers a wide range of standard boring jobs. When special shapes are required, use one of the two "universal" styles—quickly ground to finish shape.

Carboloy-tipped finish-ground boring tools are designed to fit standard boring bars. They are available in both square and round shanks, and in a wide variety of styles and sizes to cover a broad range of applications. Other standards also available for large boring jobs. Stocked for fast delivery coast-to-coast at 70 Carboloy distributors. Call your nearest distributor today. Carboloy Co., Inc., 11153 E. Eight Mile Street, Detroit 32, Mich.

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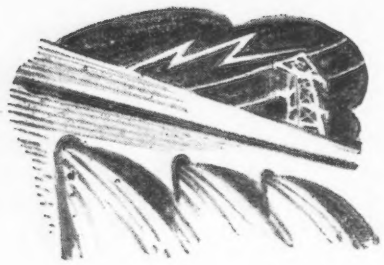
West Coast . . .

ROBERT T. REINHARDT

• Western metal show draws heterogeneous crowd . . . Aviation executives ask for government support . . . Copper demand to exceed supply for another year.



OAKLAND, CALIF.—Several thousand men and women, and not a few boys and girls, now know the difference between a lathe and an electronic microscope as the result of a visit to the Western Metal Congress and Exposition which closed here last week. There is no way of knowing just how many different persons passed through the doors of the two buildings housing the displays, but the official clocked attendance for the 6-day show was reported as 91,022, which probably indicates a total audience of between 35,000 and 45,000 when allowance is made for the repeaters.

Displays by more than 200 companies won high praise from both persons in the metalworking field and Mr. and Mrs. John Q. Public. The large number of operational exhibits and the animation of others drew large crowds, some of whom were actually interested in the processes. Not a few were more impressed with free plastic belts, curvaceous dispensers of literature and the drama of making castings.

Unfortunately this popularity did not extend to the more esoteric field of technical meetings where attendance ran from a known low of 10 persons to an estimated high of 100. The explanation of this situation most often heard was that the subjects up for discussion had all been thoroughly reported on previously. There were some outstanding exceptions, but even in these instances the turnout could hardly have warmed the heart of a speaker who had spent weary days and nights on his opus.

Bay Area trade schools made the most of the opportunity to further the education of their students and most lectures had a good sprinkling of these young men whose only complaint was that some of the presentations were "over their heads."

A member of one of the societies participating in the meetings questioned the wisdom of some of the discussions which emphasized labor saving equipment which obviously was designed to replace the type of worker well represented in the audience.

All in all, however, this first metals show to come to the Bay Area in 16 years and to the West Coast since 1941 can be chalked up as a success according to W. H. Eisenman, managing director of the exposition and national secretary of the American Society for Metals. It did reveal a surprising interest in the metals field on the part of the public and afforded western businessmen an opportunity to get first hand information on equipment and materials.

Oakland's Chamber of Commerce industrial department was especially elated with a bag of 2 "positive," 12 "reasonably sure" and 20 "prospective" site buyers attributable directly to the show.

SAN FRANCISCO — Neither scrap dealers nor buyers on the West Coast anticipate that prices here will follow the downward trend in New England since they have not reflected the sharp rises in that area.

It is the opinion of one of the larger buyers here that the drop of $3 per ton announced last week in parts of the East was partially attributable to more critical buying and that it is no longer true that "whatever the magnet will pick up is scrap."

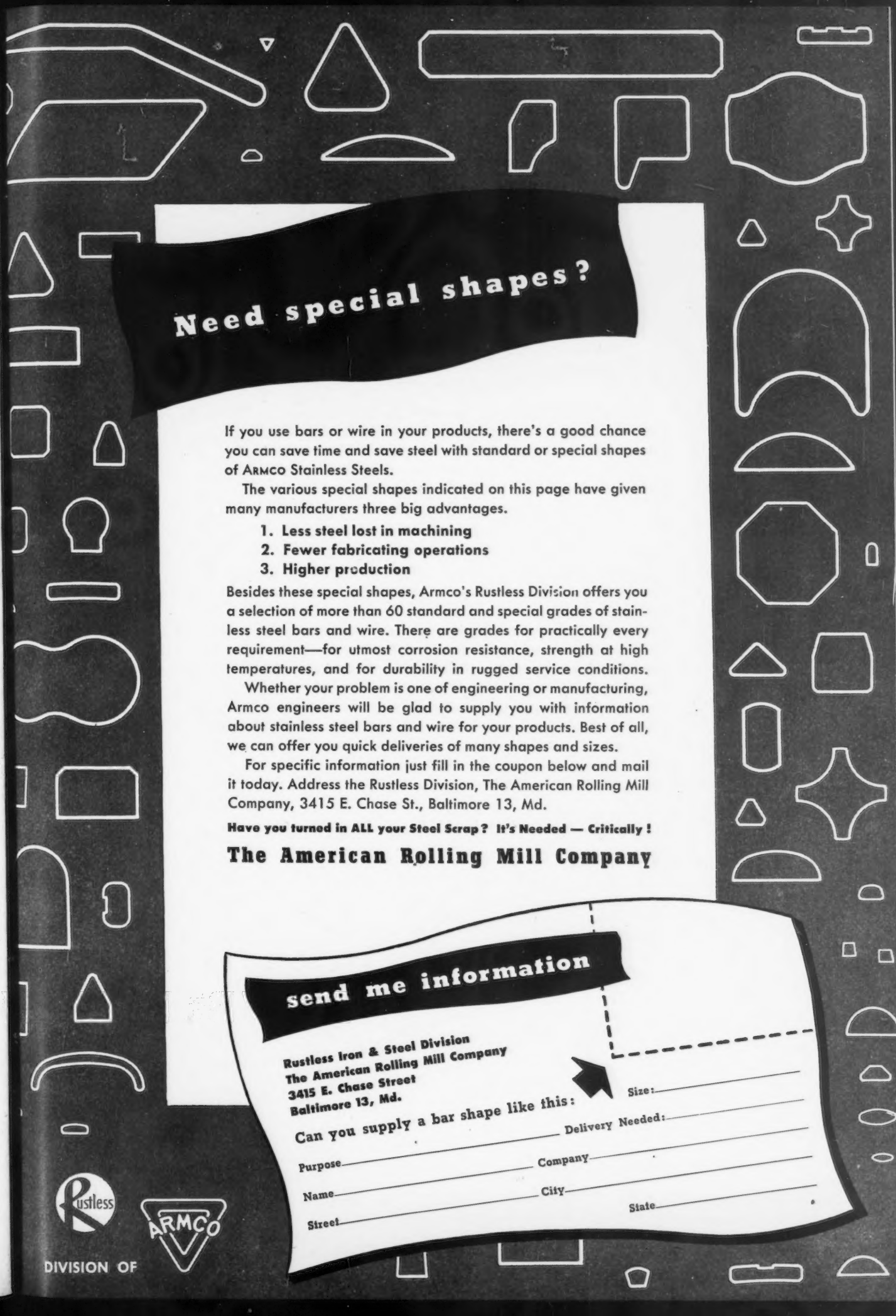
Western scrap prices haven't been speculative and while some tempting offers of higher than western going prices have been made here for scrap to go East, but little tonnage has been moved in that direction according to best available information. The tendency has been for dealers to cherish their relations with the few western buyers against the day when scrap again becomes plentiful. A southern California dealer who was offered $1.50 per ton more than the local going price for 1000 tons of scrap by an eastern buyer reportedly turned it down after consulting his usual outlet. A sale of another 1000 ton lot of No. 1 heavy has been reported at $22.40 per ton which means that it cost the buyer approximately $40.00 at his Chicago plant.

Approximately 1800 tons of 2-ft-long steel fence posts have been purchased at Barstow, Calif., for $20 per ton and this is reported going East.

There is little concern shown by buyers here over shipments away from the Coast where the situation is easing slightly. Hope for additional scrap from shipbreaking is on the rise although there is little action as yet on which to base optimism. Kaiser Co., Inc., is still breaking ships in Richmond Yard 3 which it may lose at any time and work at Terminal Island, near Los Angeles, by the National Steel & Metal Co. is being held up by labor trouble. Fourteen ways there are ready to be put into use for shipbreaking when a jurisdictional dispute is settled.

Improvement in the scrap supply in the Pacific Northwest is reported with dealers even going to the trouble to telephone buyers to let them know they have scrap to sell at going prices. However, buyers aren't allowing a few robins to persuade them to shed their red flannels.

TACOMA, WASH. — Although The Permanente Metals Corp. new soda ash plant at Owens Lake, Calif., is producing 100 tons per day, start of operations of that company's aluminum reduction plant here has been postponed until May because of the shortage of



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Whether your problem is one of engineering or manufacturing, Armco engineers will be glad to supply you with information about stainless steel bars and wire for your products. Best of all, we can offer you quick deliveries of many shapes and sizes.

For specific information just fill in the coupon below and mail it today. Address the Rustless Division, The American Rolling Mill Company, 3415 E. Chase St., Baltimore 13, Md.

Have you turned in ALL your Steel Scrap? It's Needed — Critically!

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Can you supply a bar shape like this: Size:

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DIVISION OF

alumina, production of which is dependent on availability of soda ash.

SEATTLE—William M. Allen, president Boeing Aircraft Co., states that the future of the aviation industry rests in the hands of the government and that continued survival of this industry is essential to prevent another Pearl Harbor.

According to Mr. Allen, his company could operate profitably on a backlog of $20 million a year before the war, but now, because of the growing complexity of the industry, a backlog of $50 million is essential and that such a volume must come principally from the Federal Government.

For the time being, commercial airlines are providing a satisfactory volume, due principally to the fact that they are now primarily getting the equipment which was unavailable during the war. What will happen to the demand after this backlog coming from the airlines is filled is the big question in the minds of aircraft manufacturers.

"We are making the same mistake today that we made after World War I," Mr. Allen stated. "We are walking down the same path. History has shown us that had we not made those mistakes then and had we had an adequate air force with necessary production facilities, we could have saved billions of dollars and thousands of lives."

The aircraft executive pointed out that it is difficult to start from scratch on aircraft production. He cited the fact that 4 years passed from the time the B-29 contract was signed until these planes could drop their first bombs on Yawata. The B-50 which is now in production as the successor to the B-29, would pass through much the same period before full-scale production could be achieved. Incidentally, Boeing now has contracts for 133 of these large bombers.

Boeing today has a backlog of $210 million and will deliver approximately $60 million worth of planes to the armed forces in addition to whatever Stratocruisers are delivered to commercial airlines. Mr. Allen expects that the backlog of orders will be filled within the next 2 years and that additional orders are necessary if the Boeing organization and other industrial plants supplying it are to stay in business and provide a foundation upon which to maintain and develop a national defense program.

HARRY WOODHEAD, president Consolidated-Vultee Aircraft Corp. of San Diego, Calif., has voiced much the same sentiments as those of Mr. Allen in regard to the future of the aircraft industry and pointed out last month that already our air force had become obsolete and would probably be incapable today of waging a defensive war even against a minor power. It was his contention that a cut in the military appropriations would sound the death knell for the aviation industry and place this nation at the mercy of almost any aggressor.

"All we have at the present time are some extremely wonderful laboratory specimens," Mr. Woodhead stated. "It takes years to bring an airplane from the drawing board into the air. The XC-99, the world's largest land based plane, required 5 years to produce and another 1½ to 2 years will be required to get it into production after flight tests are completed." He further added that the smaller model 240 transport plane which recently made its first flight, required 17 months to get into production.

In discussing expenditures made by the government for aircraft, Mr. Woodhead pointed out that in the 19 years between 1922 and 1940 that we had spent $1,100,000,000 for aircraft and that between 1941 and 1945, $48 billion were invested for this form of armament. "If we had spent $5 billion before the war we might have saved untold millions of dollars and thousands of lives," Mr. Woodhead said.

West Coast aircraft manufacturers are obviously keenly interested in any development affecting the military appropriation and are frank to state that while they have a selfish interest in continued government contracts, they also are sincere in their contention that to allow a decline in this industry would be suicidal. They are quick to point out that in practically every nation throughout the world the aircraft industry is either subsidized or otherwise strongly supported by the federal governments and that here a large amount of the research being done as well as production responsibilities have been left to the initiative of private capital.

SALT LAKE CITY — Demand for copper will run ahead of the supply for at least another year in the opinion of E. T. Stannard, president of Kennecott Copper Corp., who is making an annual inpection tour of Utah and Nevada properties.

The shortage of the metal, he pointed out, has been minimized up to date by additions to production from the 500,000 ton stockpile left at the end of the war. But this is now virtually gone and the pinch will be intensified beginning this month. He expects demand to start easing off early in 1948.

Mr. Stannard is not apprehensive that the proposed suspension of the copper tariff will become permanent. He expressed confidence that if the House approves the temporary suspension, the duty will be restored as soon as supply and demand come into approximate balance.

Raise Ferroalloy Prices

Canton, Ohio

• • • **The Ohio Ferro-Alloys Corp.** has announced price increases effective Apr. 1 on Simanal, and briquets of ferrosilicon, ferromanganese and ferrochrome.

SIMANAL

Cents per pound of alloy f.o.b. Philo, Ohio, freight allowed

	Lump	2 in. x D	1 in. x D	½ in. x D	¼ in. x D
Carload, bulk	9.00	9.00	9.00	9.25	9.25
Carload, packed	9.50	9.50	9.50	9.75	9.75
Ton lots, packed	9.75	9.75	9.75	10.25	10.25
Less ton lots, packed	10.25	10.25	10.25	10.75	10.75

FERROALLOY BRIQUETS

Cents per pound of contained alloying element, f.o.b. Philo, Ohio, freight allowed.

Eastern Zone	Ferro-Silicon Briquets	Ferro-Manganese Briquets	Ferro-Chromium Briquets
Carload, bulk	10.25	10.50	17.16
Carload, packed	11.75	11.80	17.45
Ton lots, bulk	11.25	11.70	17.60
Ton lots, packed	12.75	12.80	18.15
Less ton lots, packed	13.75	13.80	18.80

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Houghton's fortified lubricants live up to that promise, because:

First, the treatment given them enables a wider range of application per grade. That means less varieties needed, a fact proven in plant after plant. Then, too, these lubricants are scientifically treated to require less oil per application. Consumption and oiling time are reduced.

And finally, they are recommended only after careful study of a plant's individual needs, checking with you to combine your experience with that of the Houghton Man.

Whether your problem involves high temperature lubrication, excessive wear, water resistance, elimination of gums or sludges, excessive inventories, or the simplest item on your program—Houghton can help you. E. F. Houghton & Co., 303 W. Lehigh Ave., Phila. 33, Pa. Sales and service in all principal cities.

Houghton also offers the metal industry:

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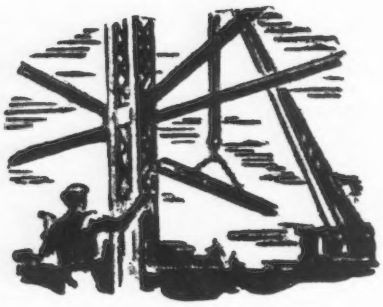
RUST PREVENTIVES ★ HEAT TREATING SALTS
DRAWING COMPOUNDS ★ CARBURIZERS

European Letter . . . JACK R. HIGHT

• British abolish traditional weekend shutdown and increase shifts to step up steel output . . . 48 hr work week established . . . Leipzig Spring Trade Fair attracts about 1500 foreign buyers.



LONDON—The first major step has been taken to do something constructive about the steel shortage in the United Kingdom. Effective Apr. 6, the time-worn British custom of closing down the steel melting shop at 1 p.m. on Saturday afternoon, and not tapping the furnaces again until 2 p.m. on Sunday is to be abolished. The move has been developed at the suggestion of the Iron & Steel Trades Confederation and is the subject of a recently announced agreement between the Confederation and the employers' association.

The press statements guess that as much as 830,000 net ingot tons per year may be saved as a result of the new agreement. Due to technical difficulties in about half of the works, it will not be possible to work the full 21 shifts per week, but it is to be the ultimate goal that all melting shops will go on as many shifts as possible. Thus, some works which have been on 18 shifts, but cannot manage 21, will shift to 19 or 20. There are 5 or 6 works which at the moment cannot operate more than 18. Under these circumstances it seems likely that the estimate of up to a million tons of extra ingot output is open to grave doubt. Some official sources have privately placed the figure as low as 224,000 tons, and the actual figure will probably be some place between the two.

The agreement simultaneously offers a solution to the "take-home-pay" problem which has been the subject of some concern to the trades union movement in the steel industry here since the end of the war. The approach to the problem of reducing hours, but maintaining the size of the pay check, has been much more cautious in England than in America. It is being considered by the labor movement against the whole British national problem of the need for increased output.

Steel melting shop workmen have been operating on a 56-hr week, and the union has been anxious to aim at an ultimate work week of 42 hr. It has made it clear during the negotiations which have gone on during the past several months that the union was not anxious to embarrass the government nor the industry in a time of a national manpower and steel shortage by demanding the immediate adoption of a 42-hr week for steel workers. As an alternative, the union offered to shift to a 48-hr week during today's conditions of a steel shortage, with an understanding that a 42-hr week is to be the ultimate goal.

AFTER several months of negotiations, the new agreement has been concluded under which the official 48-hr week becomes effective and time worked beyond 48 hr will be paid on an overtime basis. A general wage increase granted at the same time has the result of getting most workmen slightly less take-home pay for the 48-hr week than they have been receiving for the 56-hr week. The actual difference will vary in the numerous labor grades, but union officials estimate that in most cases the men will take home from 40¢ to a dollar less per week under the new program, barring overtime.

Thus the workmen in those few steelworks where it is impossible to increase the number of shifts worked per week are to get a direct wage increase. Due to the complex system of computing pay in some grades, some anomalies are expected which will cause a few workers in certain positions to lose more than a dollar per week for a 48-hr period. For this purpose a special fund is being set up and adjustments will be made to cover such cases.

The historic development of the custom in the British steel industry of closing down on Sundays is easy to trace. It is a direct outgrowth of the days when the industry was composed of a group of puddling furnaces, and closing down for the Sabbath was a simple and natural operation. In more modern times trade union officials have resisted all efforts to close the weekend gap, but despite this resistance there has been a gradual trend toward closing the gap. Thus in 1928 a concession was made from the union by the industry in the form of moving up the furnace tapping time from midnight Sunday night which was the old rule to 2 p. m. on Sunday. This concession was a part of the union's efforts to increase minimum wage rates in the industry at that time.

AT present it is assumed that rolling mills, which are known to have an excess of capacity above today's operations, will be able to handle the increased ingot output. However, British steel officials are being mildly and pleasantly surprised by their success in increasing openhearth output by conversion to oil, and in the interests of solid fuel economy a considerable number of furnaces are being converted at the present time. If these conversions continue to offer up to 50 pct increase in ingot output from the furnaces involved, such an increase in conjunction with continuous weekend working may well mean that at some time in the foreseeable future rolling mill capacity will become a bottleneck in contrast to today's situation.

Despite these efforts to increase the total British output, it seems evident that the fuel and transport difficulties of January and February have effectively skimmed off the benefits which might have accrued from all of these efforts. Before the announcement of the continuous work week, the most optimistic guesses were for the production

Any price is too high if it can be reduced

Fowler McCormick

International Harvester announces $20,000,000 price reductions

We believe there is nothing more important to this country than to lower the prices of the goods that people buy.

The American people have insisted that the government withdraw from its attempts to control prices in peacetime. That places the responsibility where it belongs—in the hands of business and industry. Not all business can reduce prices now. Not all can reduce by the same amount.

Our company has felt a duty to act as promptly as possible. In our case, the business outlook now makes it possible to move toward the goal of lower prices. The only way out of the vicious circle of higher and higher prices is to break through.

We have taken this step not because of present competitive conditions nor because of a drop in demand from customers. We have taken it because of our belief that ANY PRICE IS TOO HIGH IF IT CAN BE REDUCED.

These reductions, which will save the users of our products approximately $20,000,000 a year, will become effective before April 1, and will apply to a selected list of tractor, farm machine, motor truck, and industrial power products. Since we lose money on a few of our products, and barely break even on some others, these reductions will not apply to our entire line. Reductions will be made individually on products. Some will be cut more than others. Exact details will be announced as soon as possible.

IH prices had not gone up as much or as fast as many others

Here are Average Price Increases since 1941

All Manufactured Products... (U. S. Government Reports)	63.7%
Metals and Metal Products... (U. S. Government Reports)	41.2%
IH Motor Trucks.....	35%
IH Industrial Power Products..	34%
IH Farm Machines.....	25%

Our ability to maintain this lower level of prices will depend in part on what happens to the prices and flow of materials that we buy from others. Because we believe price reduction is vital, we are willing to assume the risks that are involved.

These benefits to customers will depend, too, on uninterrupted production at reasonable wage levels. This is not a program that can be carried out if it is hampered by strikes or work stoppages.

Our employes have had substantial increases in pay, and wage questions are currently being discussed with many of the unions with which we deal. Stockholders have recently had an increase in dividend rate. Having considered the interests of these two groups, we are now making these price reductions for the benefit of the third group—our customers.

Business, to our way of thinking, has a social as well as an economic responsibility. This company has long followed the policy of operating in the interests of three groups—its customers, its employes and its stockholders. The duty of the management is to see that equal justice is done as between the three groups.

This price reduction program is another demonstration of our policy in action.

INTERNATIONAL HARVESTER

15.40 million tons of ingots in Great Britain this year, and, recognizing this figure as an optimum, official sources hoped that production would be not less than 14.84 million tons.

The first and last quarters of the year should be the best production periods for the British industry, and January - February - March should have made a substantial contribution if a 14 million plus figure was to be attained. After getting away to a fair start, however, operations in one week at the end of February dropped to below an annual rate of 11 million tons, and have only begun to make a recovery.

CONSERVATIVE sources estimate now that there is no possibility of maintaining a 13 million ton rate over any given period until the last quarter of this year. Second quarter production will be marred by a traditional 4-day Easter weekend plus 3 days' holiday at Whitsuntide at the end of May, and the third quarter will see considerable disruption for the two weeks' holiday in the industry which is mandatory under the terms of the new agreement with the union.

The steel industry is now carrying on a quiet campaign to obtain as substantial fuel allocations as possible from the nationalized coal mines. The situation is certainly somewhat confused, as up until the end of last year the steel industry, being closely connected with the ownership of the coal mines in Great Britain, was in many cases well represented on the regional coal boards which function to allocate coal supplies in the various districts of the United Kingdom.

The contacts therefore were very good, and fuel allocation problems for the steel industry were virtually nonexistent. For the first few weeks after the government took over the coal mines, as long as everything was operating smoothly there was little disruption to the normal routine.

The general position of the government in such a situation is to recognize its own shortage of competent administrators, and if it finds an organization which is functioning satisfactorily the policy is to leave it alone where possible. The fuel disruption, however, of the past few weeks has put the whole distribution system in a state of flux, and it may be increasingly difficult for the steel industry in the future to do so competent a job of arranging satisfactory quantities and qualities of coal in the course of informal business luncheons.

ALTHOUGH it was done to attract foreign buyers, there was still not much to buy in the Leipzig Spring Trade Fair. The exhibition stands were almost twice as large as last year, and about 1500 foreign visitors attended. Buyers came from Denmark, Switzerland, the Netherlands, France, United Kingdom and a few from America, but found very few goods for which they could place orders, although they did have an opportunity to take a quick peek behind the iron curtain.

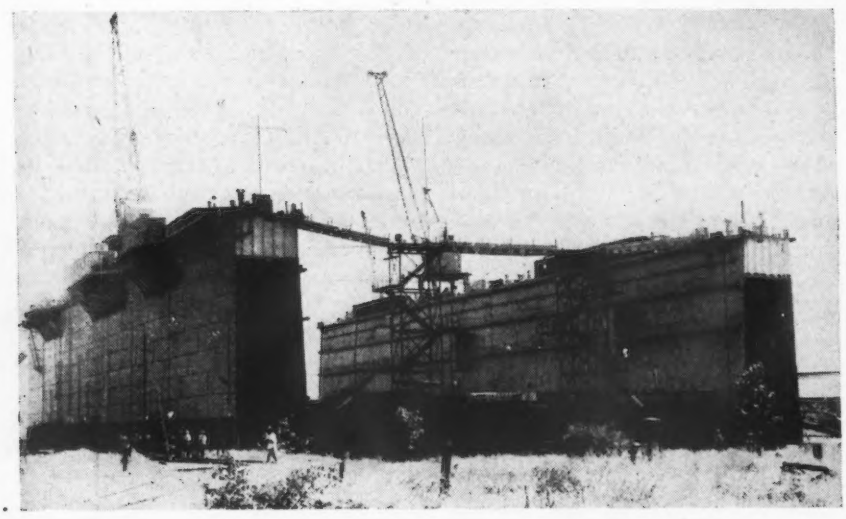
In the machine tool halls most of the machines were of old patterns, and detailed information on the present level of production or delivery delays were difficult to obtain. Some of the firms which were earmarked for reparations by the Russians have been left to work on the spot for the Red Army and have been changed to Sovietische A.G. In addition to the others which have been dismantled, there are some which are now being administered by local government units in the Russian zone and some by workers unions.

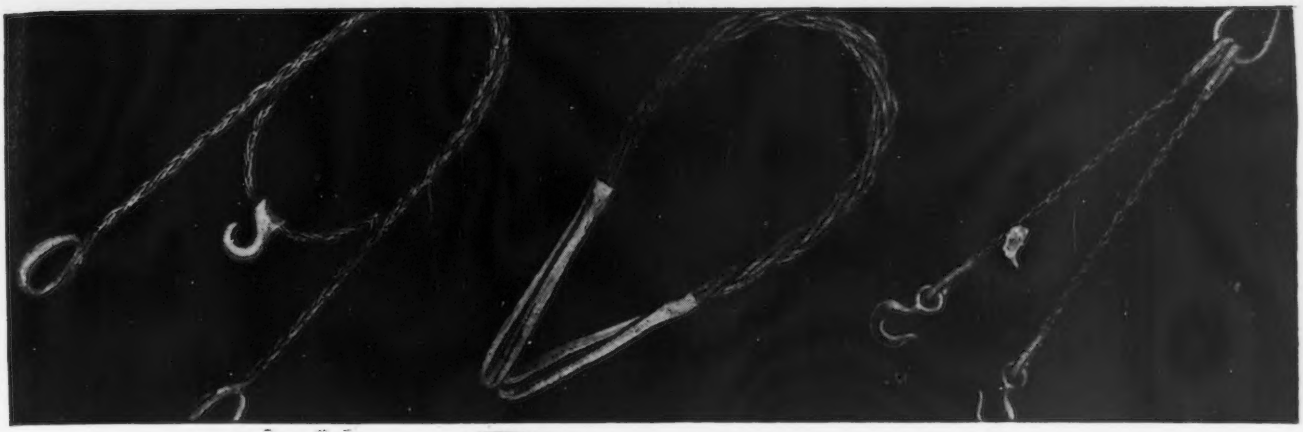
Although the Russian zone lacks steel, it possesses important manufacturing industries. The Mitteldeutschen Stahlwerke have been dismantled, but one openhearth furnace has been rebuilt in the Riesa works and started operating at the end of February. The Maximilian Hutte iron and steelworks, which have been nationalized, formerly belonged to the Flick Konezern armament manufacturers. About 3200 workers are reported to be employed at present, but no iron is being produced. The iron works are at Unterwellenborn, and iron ores came from small mines at Smiedefeld in the Thuringen Forest.

Typewriter manufacturers, Rheinmetall, Fortuna, and Wanderer, exhibited machines with Russian lettering; the Metallurgische A.G. from Thale showed sintered products in iron and steel which are manufactured by using scrap as raw material; the Werrawerk Hartmetall Fabrik of Niederschmelden, which is now a Russian corporation, exhibited carbide tools. The Zeiss optical works and their subsidiary, the Schott glass manufacturing company at Iena, could only exhibit posters as their equipment was dismantled last October. They expect, however, to work again in two shops next summer.

One company, the Keramische Hescho - Kahla, which has been changed to the Electro-Technische Sowjet A.G., showed a new ceramic material which can be used to build ball and roll bearings, but no technical information was given when an engineer was asked for some figures about wearing qualities.

EAST OF SUEZ: *The second portion of a floating drydock capable of handling 50,000-ton ships, after launching at Colaba, near Bombay. The two portions of the floating dock will be towed through the Suez Canal to a port in the eastern Mediterranean for the British Admiralty. The dock was originally intended for Singapore.*





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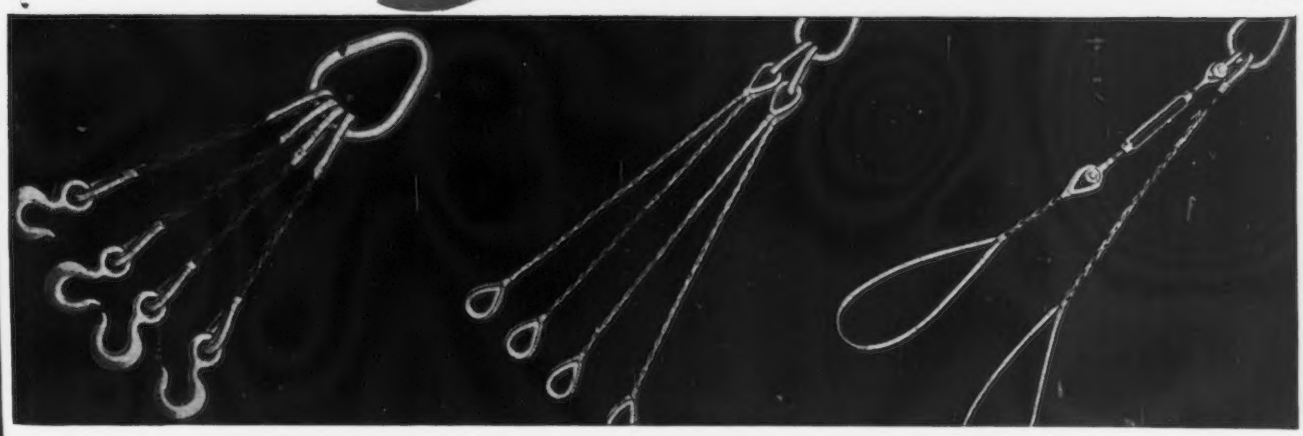

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PERSONALS

° ° °

• **Robert C. Enos** has been elected chairman of the board of the E. W. Bliss Co., Brooklyn. He has been a Bliss director since 1945. The vacancy on the board, resulting from the resignation of D. S. Harder, was filled by the election as a director of **Franklin Berwin.**

• **Roy V. Thomas** has been appointed personnel manager of the Ohio Crankshaft Co., Cleveland. He comes to Ohio Crankshaft from Brewing Corp. of America, where he was personnel director. Prior to this connection Mr. Thomas held managerial positions with Telling Belle Vernon Co. and Thompson Products Co.

• **J. Walter Gullicksen,** superintendent of the Worcester Pressed Steel Co., Worcester, Mass., has been made a director. He went with the Worcester company from the Aluminum Co. of America in 1942 as assistant to the general manager.

• **Ellwood G. Peterson** has been elected president of the Hannifin Corp., Chicago.

• **C. R. Harmon** has been appointed Pittsburgh district sales manager for Firth Sterling Steel & Carbide Corp. McKeesport, Pa. Mr. Harmon until recently was sales manager for Penn Carbide & Alloy Casting Co. and formerly was with Jessop Steel Co. and Crucible Steel Co. of America.

C. R. HARMON, district sales manager, Firth Sterling Steel & Carbide Corp.

• **Harold L. Posner** has been named president of Pallet Sales Corp., New York, succeeding Mortimer A. Lowe, founder of the parent organization, who died in December. Mr. Posner was associated with Mr. Lowe in the early days of the Pallet Sales Co., but resigned to enter government service and later engage in war production work. **Curtis H. Barker, Jr.** has been designated vice-president and director of research and service. During the war, Mr. Barker was technical director of the field operations branch of the U. S. Navy Dept.

• **Robert W. Hadley** has been appointed president and **Harold F. Smith,** treasurer, and both were elected directors of American Coach & Body Co., Cleveland. Mr. Hadley began his career in the machinery business in 1916 with the Toledo Machine & Tool Co., rising from machinist to vice-president in 15 years. When E. W. Bliss Co. acquired Toledo Machine & Tool Co., Mr. Hadley was appointed chief executive officer in charge of the plant, a position he held 15 years. Mr. Smith started his business career with Willys-Overland. After World War I, he trained in accounting and office administration and joined Toledo Machine & Tool Co. in 1929 as auditor. He became a director in 1931 and was elected secretary-treasurer.

• **John C. Virden** and **Martin P. Winther** have been elected directors of the Eaton Mfg. Co. of Cleveland. Mr. Virden is chairman of the board of John C. Virden Co., Cleveland, and Mr. Winther is president and general manager of Dynamatic Corp., Kenosha, Wis., wholly-owned subsidiary of Eaton Mfg. Co.

• **W. E. Curran** has been named general manager of Rheem Mfg. Co. He is also a vice-president and director. Joining Rheem in 1942, Mr. Curran was made vice-president in charge of production in 1943, and in February of 1946 was elected a director. He will continue to make his headquarters in New York.

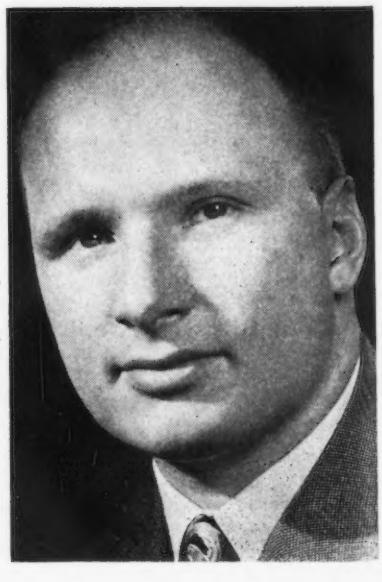
• **Walter A. Vahle** has been appointed assistant to the director of purchases and traffic, Monsanto Chemical Co., St. Louis. He is assigned to special duties. **Harry F. Klocker** has been appointed general traffic manager to succeed Mr. Vahle. The new assistant director has been traffic manager of Monsanto since 1922. He was employed by the St. Louis-San Francisco Ry. for 15 years before joining the St. Louis concern.

• **W. N. Noble** has been appointed manager of the frit division, Ferro Enamel Corp., Cleveland. Mr. Noble succeeds **Louis B. Hart,** who has been appointed west coast sales manager of Ferro. Mr. Noble joined Ferro in 1933.

• **Col. Howard W. Robbins** has retired from his position as safety engineer of Norton Co., Worcester, Mass., after 31 years' service. Colonel Robbins held this position since 1923. **John Hychka** of the company's plants engineering department has been appointed to succeed Colonel Robbins.

• **Frederick E. Munschauer, Jr.** has been appointed works manager of the Niagara Machine & Tool Works, Buffalo. Before entering the armed forces he was in charge of production and plant engineering, and since returning from war service he had been acting works manager.

FREDERICK E. MUNSCHAUER, JR., works manager, Niagara Machine & Tool Works



• **Milton La Riviere** has been appointed regional manager of the St. Louis area, Electro-Motive Div. of General Motors Corp. **Mr.** La Riviere succeeds **G. E. Anderson,** who has retired after being in charge of Electro-Motive sales in the St. Louis region since 1925. Mr. La Riviere was executive general agent of the Atlantic Coast Line R.R. before starting with Electro-Motive as district sales manager in Washington in 1944. **Robert E. Hunter** has been appointed district sales manager of the Chicago region, Electro-Motive Div., General Motors Corp. Mr. Hunter was formerly manager of the statistics and market analysis section of the sales department.

• **Charles C. Winn,** clerk and treasurer of the Wyman-Gordon Co., Worcester, Mass., will retire July 1, and will be succeeded by **Sacket R. Duryee. Frank E. Wellington,** assistant manager, and **John H. Nelson,** vice-president of engineering, also will retire July 1.

• **James L. Turrentine** has joined Pitney - Bowes, Inc., Stamford, Conn., as a member of the postage meter makers' public relations staff. He previously held editorial and public relations posts with the Shell Oil Co. and the Hazard Advertising Co.

• **Ford R. Snyder** has joined Hickman, Williams & Co., Chicago, as metallurgist. Prior to his joining the company, he was in charge of melting, heat treating, and process control of steel castings produced by the cupola-converter-acid electric triplexing process at the John Deere Co.

• **Charles M. Brown** has been appointed sales manager of the American Coach & Body Co., Oakland, Calif. Mr. Brown entered the steel fabricating business in 1932 with National Steel Products Co. and served as sales engineer until 1938. During the succeeding years until the war, he was factory representative for McCabe Powers Auto Body Co. Through the war years, Mr. Brown was associated with Consolidated Aircraft Corp. as tooling engineer.

LYNDON C. COLE, chief engineer, machine division, Osborn Mfg. Co.

• **Lyndon C. Cole** has been appointed chief engineer of the machine division of the Osborn Mfg. Co., Cleveland. He was previously associated with the Cleveland Automatic Machinery Co. as chief engineer and the Cleveland engineering office of the Hydraulic Press Mfg. Co.

• **Chris Jensen, Sr.,** who has been in the automatic heat controls field for 32 years, has been appointed foreign representative and engineer for the Perfex Corp., Milwaukee, and will make his headquarters at Oslo, Norway.

• **John M. Bastion** has been appointed Goodyear Tire & Rubber Export Co.'s sales representative, with headquarters in San Francisco. He will be in charge of the company's complete line of export items. He joined Goodyear in 1938 on the company's production training squadron. He later joined the Army Air Force and since his return from military service, he has been associated with Goodyear Tire & Rubber Export Co.'s mechanical goods department in Akron, Ohio.

• **Edward W. Lafferty** has been placed in charge of sales in the Philadelphia-Washington area for Cosa Corp., New York. During the war years Mr. Lafferty served in the U. S. Army and recently returned from China, where he acted as an industrial consultant to the Chinese National Government.

• **Karl N. Carter** has joined the Ohio Rubber Co., Willoughby, Ohio, as manager of general sales, exclusive of the automotive and other accounts served by the Detroit office.

• **H. L. Stiles** has been appointed chief engineer and **Frank P. Rodwick,** production engineer, of Chicago Electric Mfg. Co., Chicago.

• **Dr. Melville F. Peters,** formerly in charge of research at Titeflex, Inc., Newark, N. J., has been appointed chief engineer. Before joining the Titeflex organization in 1943, Dr. Peters was a principal physicist at the Bureau of Standards in Washington, where he worked extensively on ignition systems for aircraft engines. In addition to his new duties as chief engineer, Dr. Peters will continue to direct basic research on Titeflex products.

• **William R. Howell** has been appointed general superintendent and **Mathias J. Meinen,** assistant general superintendent, of the Midland Works of the Crucible Steel Co. of America, New York. Mr. Howell has been affiliated with the Crucible plant since 1921, when he came to Midland as a laborer. He became chief inspector in 1928 and in 1936 was made superintendent of inspection. In 1944 he became superintendent of both inspection and metallurgy. Mr. Meinen has been an executive of the Midland plant since early in 1940, when he came from the Universal-Cyclops Steel Corp. in Pittsburgh to become superintendent of the electric furnace department at the Midland Works.

• **W. W. Bowie,** formerly manager of the New Orleans office of the Ladish Co., has been appointed manager of the new Atlanta office.

• **G. E. Lott** has recently been appointed director of purchases of Motor Products Corp., Detroit. Mr. Lott's staff consists of **George G. Steelman,** purchasing agent; **Hobart F. Marling,** material control; and **Frank W. Durand,** material followup. A previous report on this personal change showed misspelled names.

• **Harold F. Mackey** has been appointed supervisor of diesel engines of the Santa Fe R.R. at Chicago. Mr. Mackey started with the Santa Fe as a telegraph operator in 1923. He has held various positions at Topeka shops and in 1939 became diesel maintainer at Chicago, in 1943 he rose to diesel foreman at Winslow, Ariz., and a year later was promoted to assistant supervisor diesel engines, with headquarters at San Vernardino, Calif. Mr. Mackey succeeds **Thomas T. Blickle,** who was appointed master mechanic at Dodge City.

• **Robert Hannan** has been appointed a district representative for the Beardsley & Piper Co., Chicago. Mr. Hannan's territory will include northern Illinois, Iowa, Wisconsin, Minnesota and the peninsula of Michigan. He has been with the company for 6 years and his experience includes work in the development, construction and installation of various products.

• **Theodore C. Jensen** has been appointed superintendent of paint and enamel manufacture, and **Frank H. Russell** has been appointed superintendent of vehicle manufacture for the new Springdale, Pa. paint plant of Pittsburgh Plate Glass Co. Mr. Jensen has been associated with Pittsburgh Plate's paint division for 13 years. Since 1940, he has been production foreman at the firm's Houston plant. Mr. Russell has served in technical positions at the Milwaukee plant since 1937. After 5 years' service as a research department chemist at the Wisconsin plant, Mr. Russell was promoted to varnish and resin technician, a position he held until the current appointment.

• **Elmer A. Koenig** has been appointed assistant sales manager, Yoder Co., Cleveland. He has been in the sales department of Yoder for the past 4 years, having joined the company in 1942.

• **J. J. Murray,** formerly of the Heltzel Steel Form & Iron Co., Warren, Ohio, has accepted a position as general manager of the Falls Welding & Mfg. Co., Newton Falls, Ohio.

• **Albert J. Kuhn,** purchasing agent for the Huenefeld Co., Cincinnati, has been elected vice-president in charge of purchasing and member of the board of directors. Mr. Kuhn started with Huenefeld as office boy in 1912. During his many years of association with the company, he has served in the billing, advertising, sales and purchasing departments.

• **Herman Wagen,** foreign sales representative in Milwaukee for the Heil Co., has been appointed district sales manager for Wisconsin, Illinois, Indiana, Ohio and Kentucky with headquarters at Milwaukee.

• **Julius Heil,** founder of the Heil Co., Milwaukee, and former president until 1946, has been elected chairman of the board of Heil to succeed the late Herman W. Falk.

• **William P. Webster** has been elected to the board of directors of Clark Mfg. Co., Cleveland. He joined the company in 1944 as office manager, later becoming purchasing agent, then assistant to the secretary.

• **Ed Clabuesch** has been named field service representative for Twin Coach Co., operating out of the company's service division headquarters in Kent, Ohio. Until recently, he was service manager of Packer-Pontiac.

• **Arden R. Hacker** has been appointed manager of mechanical goods design at Goodyear Tire & Rubber Co.'s plant in Hurlingham, Argentina. Mr. Hacker joined Goodyear in 1935. He started in Akron on the company's production training squadron and then worked 3 years for Goodyear Tire & Rubber Export Co. During the war Mr. Hacker served in the field artillery. Since his return to Akron a year ago he has been a designer in Goodyear's mechanical goods division.

• **Andrew B. Sides,** president of the New England Shipbuilding Corp., South Portland, Me., during the war, has been made a director of the Bath Iron Works, Bath, Me.

• **Robert W. Ferrell,** formerly counsel for the General Electric Co.'s electronics department, Syracuse, N. Y., has been appointed manager of employee and community relations of the Affiliated Mfg. Companies Dept. of the General Electric Co. He came to GE law department in 1937, and has had a variety of legal and other assignments with the company.

OBITUARY...

• **J. J. Wilson,** 59, Seattle branch manager of John A. Roebling's Sons Co., died on Mar. 6. He began his association with Roebling in 1920 as a wire rope engineer.

• **Joseph A. Carberry,** 56, president of the Buffalo Plumbing Supply Co. since 1929, died suddenly Mar. 15. He went to work for the company in 1909 as an office boy.

• **Harbour Mitchell,** vice-president of E. J. Lavino & Co., Philadelphia, died suddenly after a brief illness on Mar. 23. He was connected with the American Foundry & Construction Co. from 1908 to 1923, and was vice-president of E. J. Lavino & Co. from 1924 until his death. He was president of Compania Cubana de Minas Y Minerales, S.A., Havana, Cuba, and vice-president of Lavino Shipping Co., Philadelphia.

• **Earl H. Wheeler,** 56, mechanical engineer and screw machine expert, died suddenly Mar. 4. Mr. Wheeler was for many years connected with the old Gridley Machine Co. and in later years was an officer of the New Britain Gridley Machine Co. At the time of his death he was a partner in the Poly Choke Machine Co. in Tariffville, Conn.

• **Roland F. Benzinger,** 55, president of the Electric Furnace Co., Salem, Ohio, died Mar. 25, after 22 months' illness from a heart ailment. He was one of the founders of the Electric Furnace Co., having served as its vice-president and secretary from 1923 to 1937 and as its president since 1937.

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Material handling by Northern Cranes and Hoists gets material movement up off the floor—into the air—it gives you the extra floor space free. It's convenient, quick—and, in the long run, very low in cost.

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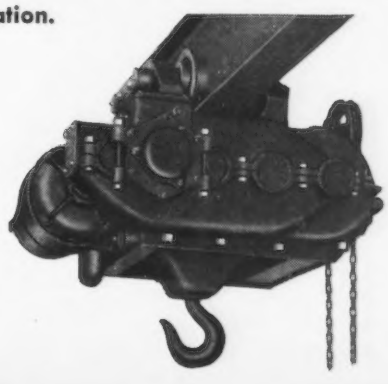
Hi-Lift feature provides 12″ to 36″ extra lift, according to the capacity of the hoist. Exceptionally heavy construction—they take plenty of overload. Built for fast, continuous, trouble-free operation.



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Dear Editor:

NALOY DEFINED

Sir:

On p. 94 of the Feb. 27 issue you ask about the identity of Naloy. . . . Information on this steel is somewhat limited, but has been identified as an iron carbon alloy steel used for certain types of cutting tools and sponsored by National Broach & Machine Co., Detroit. . . .

JAMES A. LEAHY
805 Wesley Ave.
Oak Park, Ill.

● Thank you, Reader Leahy, for this information. National Broach, the manufacturer, further describes Naloy as a high speed type steel which receives a special surface treatment to increase tool life. The finish produced by this special process has the appearance of gunmetal and is applied to all types of cutting tools, broaches, gages, etc. The company is applying the process only to tools produced in its own plant and does not accept orders for treating tools produced by other manufacturers.—Ed.

GM POSTERS

Sir:

In your issue of Feb. 13, there appeared a number of posters which were used by General Motors, concerning the elimination of waste, increases in production, and quality of goods. Would you kindly inform us where you think we might obtain copies of these posters.

W. F. FINDLAY
Findlays Ltd.
Carleton Place, Ontario

● Through the courtesy of E. J. Ruffin of General Motors public relations staff, we are sending you a complete set of the posters.—Ed.

CORROSION DATA

Sir:

We are interested in the item on p. 133 of the Feb. 13 issue covering a report by the British Dept. of Scientific and Industrial Research on the use of bituminous materials for the protection of iron and steel against corrosion. Where can we secure reprints of the complete review which is mentioned?

THOS. T. ROYSTON
Vice President
Royston Laboratories, Inc.
Blawnox, Pa.

● A copy of the complete report, "Chemical Research Special Report No. 5" entitled "Bituminous Coatings for the Protection of Iron and Steel Against Corrosion" has been forwarded to you from London by our European editor.—Ed.

STEEL PRODUCTION

Sir:

We are interested in securing some figures which indicate rate of steel production in tons rather than by capacity as usually shown in your weekly publication. Would appreciate your advising if there are any figures available either on a weekly or monthly basis which would indicate this tonnage figure.

L. R. WECHSLER
Athos Steel Service
Philadelphia

● AISI figures giving monthly steel production in net tons as well as per cent of capacity are published as a regular feature once a month. A tear sheet of the January figures appearing in the Feb. 20 issue is being forwarded.—Ed.

HOT-DIP GALVANIZING

Sir:

We would appreciate receiving tear sheets or reprints of the article, "Effect of Lead in Hot-Dip Galvanizing Baths" by W. G. Imhoff, appearing in the Jan. 9 issue.

J. N. PETERSON
John Wood Mfg. Co.
Philadelphia

HOOKED RODS

Sir:

Could you advise us as to whether hooked rods used in reinforcing concrete can withstand a greater stress in bond than when using same size steel rods, but with pieces spot welded across the rods?

P. J. MULVIHILL
Appraiser—Div. 1
National Revenue, Canada
Winnipeg

● Interpreting your question to mean basically whether a bent rod will withstand greater stress in concrete bond than a welded rod, we have been advised the welded rod will withstand greater stress. Further information on the subject can be obtained from the National Concrete Masonry Assn., 33 W. Grand Ave., Chicago.—Ed.

STAINLESS RINGS

Sir:

Would you please send us tear sheets of the article, "Roll Bending and Flash Welding Stainless Rings," appearing in the Jan. 23 issue.

RALPH R. HUFFMAN
Taylor Winfield Corp.
Warren, Ohio

ANODIZING ALUMINUM

Sir:

I understand that in the Sept. 5 issue under the heading of "Surface Finishes for Aluminum" by J. F. Mason, a new process for anodizing aluminum using sulfuric acid was given. Since this was published prior to my becoming a regular subscriber to your magazine I should be extremely obliged if you could forward me a copy of this paper . . . Incidentally, I am an electrochemist and would welcome contact with the inventors of any new processes in the metal finishing field as I think an interchange of ideas would be beneficial to both sides . . .

FRANK TAYLOR
113, Amberley Rd.
Bush Hill Park
Enfield, Middx., England

● The process was described in the article, "Surface Finishes for Aluminum" by J. F. Mason. We are forwarding your letter to Mr. Mason, Reynolds Research, Glen Cove, N. Y.—Ed.

COMPARABLE TOOL STEELS

Sir:

Kindly let us know if it would be possible to obtain 6 copies of "Chart of Comparable Tool Steels," published in the Feb. 1, 1945 issue.

A. VESCUSO
Laboratory Engineer
Lepel High Frequency Laboratories, Inc.
New York

● Six copies have been mailed to you. The chart is available to readers at 15¢ per copy.—Ed.

AAF MANAGEMENT PROGRAM

Sir:

In your Jan. 30 issue there appeared an article entitled "Army Air Forces Embarks on a New Management Program." This was very interesting. Can you tell me how to obtain more information on this scientific approach to management?

L. W. GEAKE
9 St. Therese St.
Jonquiere, Quebec

● Additional information on this subject may be obtained from Maj. Gen. Fred L. Anderson, Jr., Assistant Chief of Air Staff, Hdqts. Army Air Forces, Washington.—Ed.

TINNERS SNIPS

Sir:

We are wholesalers and importers of roofing and tinsmithing supplies and owing to the heavy demand for tinners snips we have been unable to get ample supplies of this item. Will you kindly give us names of manufacturers of tinners snips?

F. E. ANSELL
McDermid Bros., Ltd.
Toronto

● List of manufacturers of tinners snips has been forwarded.—Ed.

LIQUID BUFFING

Sir:

With reference to the article, "Metal Finishing," in the Jan. 2 issue, we are interested in the buffing process mentioned among the technical developments and are writing to inquire if it is possible for you to let us have further particulars of this. . . . Can you put us in touch with the writer of the article, Adolph Bregman, consulting engineer?

M. COOLUF
E. P. Jenks, Ltd.
Wolverhampton, England

● We are forwarding tear sheets of several articles on liquid polishing which we have published. Mr. Bregman's address is 123 William St., New York City.—Ed.

Monarch's Speedi-Matic gives you

up to 10 preselected speeds—automatically

● Automatic electronic speed change—repeated piece after piece without attention on the part of the operator!

That's *one* of the reasons why the Monarch Speedi-Matic is winning the reputation of the "World's Fastest Hand Screw Machine"—and justifiably so: finished-parts production times are really *production* times, hardly more than the total of the actual times required for the separate cuts—each made *at the optimum surface cutting speed for that particular operation.* (And spindle speeds range up to 5,000 rpm!)

Take the part shown, for example—five different spindle speeds, from a low of 250 rpm to a high of 3,800 rpm—yet the *total* time, including five separate machining operations, is only .43 minutes. Match that record on your present machine, if you can—then send for complete information on the Speedi-Matic!

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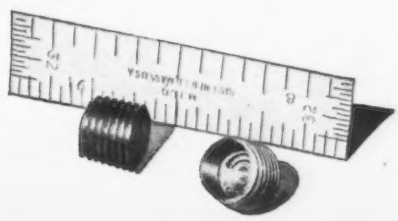
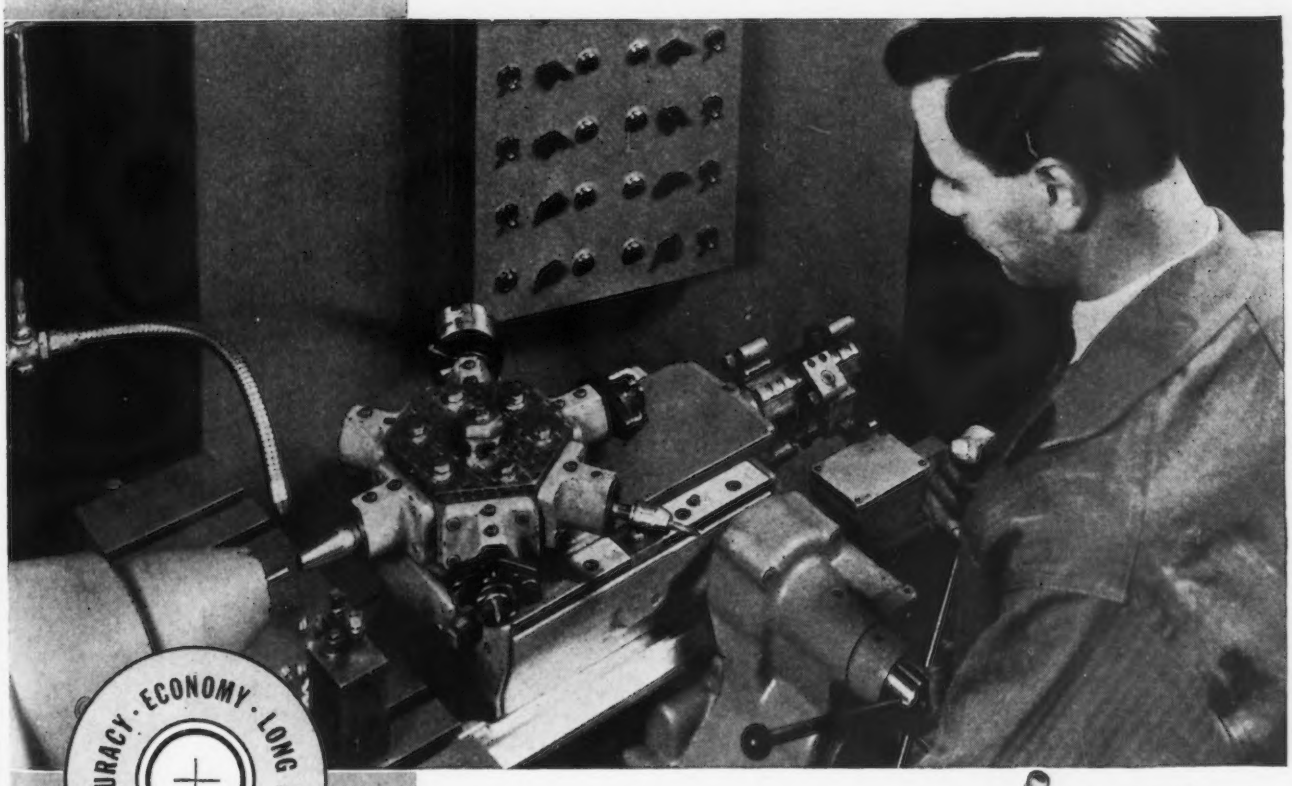
THE PART—spring cap, $\frac{3}{8}$" diam., $\frac{5}{16}$" long; x 1315 steel.

THE PRODUCTION FACTS—Center drill at 3,800 rpm; $\frac{9}{32}$" drill at 3,300 rpm; Flat bottom drill at 3,500 rpm; Thread at 250 rpm; Cutoff at 2,500 rpm. Total time—.43 minutes.





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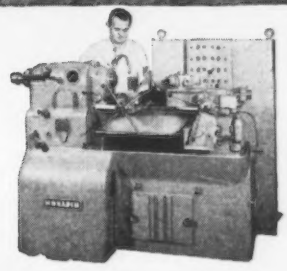
Monarch TURNING MACHINES

For "peak production at a profit" —on bar work up to $\frac{7}{8}$" diameter, in lots of 25 to 500 or more—write for our new 20-page catalog on the Monarch Speedi-Matic.



Industrial News Summary...

- **Downward Scrap Trend Now Intensified**
- **Prices Are Off in All Major Centers**
- **Steel Ingot Rate Declines 1 Point**

SCRAP prices declined this week in every major district in the country. Average quotations on heavy melting steel were down $2.75 a ton at Philadelphia, $3.25 in the Youngstown area, $1.50 at Chicago, $2 in Pittsburgh, $2.50 in Boston and $2.88 in New York.

The downward trend that appeared last week has now become a definite downward movement and it is almost certain that one of the greatest scrap price peaks in history has been passed. THE IRON AGE scrap composite price this week reflecting changes at Pittsburgh, Chicago and Philadelphia is $37.33 a gross ton, down $2.17 a ton from last week's level of $39.50.

Sensing that the trend of scrap price is definitely downward, scrap consumers are attempting to take advantage of this fact by refraining from buying as far as possible. By this method it is hoped that prices can be depressed further. While there was an indication this week that additional declines in the scrap price level are in order, there was no concrete evidence yet of a drop comparable in speed and degree with the upward trend which began last fall.

EFFORTS in some quarters to minimize the effect of the "memorial strike" in the coal fields this week do not alter the fact that one large producer may be forced to take off as many as eight blast furnaces in the Pittsburgh district because of coke shortages. These units are entirely dependent upon beehive coke for fuel and since beehive coke workers will observe the mine shutdown this week, some firms in the Middle West may feel the effects of the loss in coal for some weeks to come.

The drop in the steel ingot rate this week from a revised rate of 97 pct to 96 pct of rated capacity is not considered to reflect a downward movement. Gas shortages at Pittsburgh and the probable effects of the coal mine shutdown this week are more responsible than any other factors. This situation is temporary and it is to be expected that normal fluctuations in the steel ingot rate will take place from time to time.

The relationship between the U. S. Steel Corp. and the steelworkers union continues unruffled and static, but the dilly-dallying in Congress over portal-to-portal legislation might change this serene state of mind on the part of both the company and the union. Whether or not Philip Murray, USWA head, can continue to postpone militant action on a wage increase and at the same time keep his men in check remains to be seen. The steel corporation will definitely make no wage increase commitments until the danger of portal-to-portal retroactive payments is completely eliminated.

IF the portal-to-portal bill is vetoed by President Truman because of labor legislation other than the specific portal-to-portal pay problem, a crisis may develop in the steel labor situation if a new bill is not almost immediately prepared and passed. The continual deferment in steel wage negotiations is beginning to snap the nerves of some steel workers as well as some steel officials. Labor and management would come to an agreement quickly if the portal-to-portal legislation framed to take care of that problem alone were quickly passed.

Steel consumers last week in general were not finding steel supplies any easier to obtain but there were additional signs that a more normal market is already in the making. Some companies are making headway in reducing backlogs other than for flat-rolled material. Still other companies report that incoming business in March was not as heavy as in February. Orders so far this year are still running ahead of the same period a year ago but in recent weeks the difference has been reduced.

Steel officials in one major consuming area say that demand for steel products other than sheets and small bars started to contract a few weeks ago. Warehouse supplies that have been low for months on end are beginning to be replenished slowly and some customers are becoming a little more choosey on items they ordinarily buy.

THE movement of steel salesmen on the mass of consumers in an effort to line up customer relationships for the time when the decline in steel demand may assume large proportions was in full blast last week. Areas have been thoroughly studied by sales managers and choices have been made by firms as to where the greatest attack will be made. This strategy is predicated almost solely on freight rates and other charges which would have to be absorbed in meeting competition. Decisions are not ironclad because many steel producers are having a little difficulty in recalling their competitive experiences of several years ago.

In the steel market sales picture it can be pointed out that any sales policies adopted today such as variations in the basing point system do not necessarily mean that they will be permanent. A steel buyers' market often changes sales policies which were based on a sellers' market. There is no reason to believe that this rule has been eliminated for the steel industry.

While the steel industry has been criticized in some quarters for its alleged inability to furnish greater quantities of pig iron for merchant use, official figures do not support such criticism. Since last August the output of pig iron has advanced steadily while that portion directed to merchant channels has increased at a far greater rate. The amount of pig iron used for steelmaking and for ingot molds increased about 2 pct from last August to January of this year. During the same period pig iron shipped into merchant trade channels increased 22 pct.

• **CXS RATINGS**—Governmental authority to rate export orders for steel products was continued to June 30, 1947, under a limited extension of the Second War Powers Act enacted this week. Allocations of tin and antimony were also continued. The legislation provides that allocations for export may be made to further production of materials needed in the United States or to meet international commitments. However, in no case may any materials or facilities which were not being allocated on Mar. 24, 1947 be allocated after Mar. 31.

• **GEAR SALES**—The gearing industry shows an increase in volume of sales for February 1947, as compared with January 1947, of 7.4 pct. This report does not include turbine or propulsion gearing. The index figure for February 1947, was 376.

• **MORE EXTRA CHANGES ON WAY**—The move in the steel industry to reduce extra charges where inequalities have been found—started a few weeks ago by Carnegie-Illinois Steel Corp.—will be broadened to include products in addition to those already announced. Some changes will be made in wire rod and other wire product extras while studies are also being made on tubular goods items. Action on the latter, however, may not take place for several weeks. Contrary to predictions in some circles, reductions in the base price of steel products will not take place this week and no specific consideration is being given such action at this time.

• **INVENTORIES HIGH**—Value of manufacturers' inventories rose to a new postwar high of $20.7 billion at the end of January, an increase of $385 million over December, according to the Dept. of Commerce industrial survey. Little or no change was noted in iron and steel and building materials inventories, however. For the same period, shipments of manufactured goods totaled $13.2 billion, representing an increase of only $375 million over the previous month. The nonferrous metals, automotive and machinery industries registered declines up to 5 pct while in iron and steel, a small increase was noted for the month.

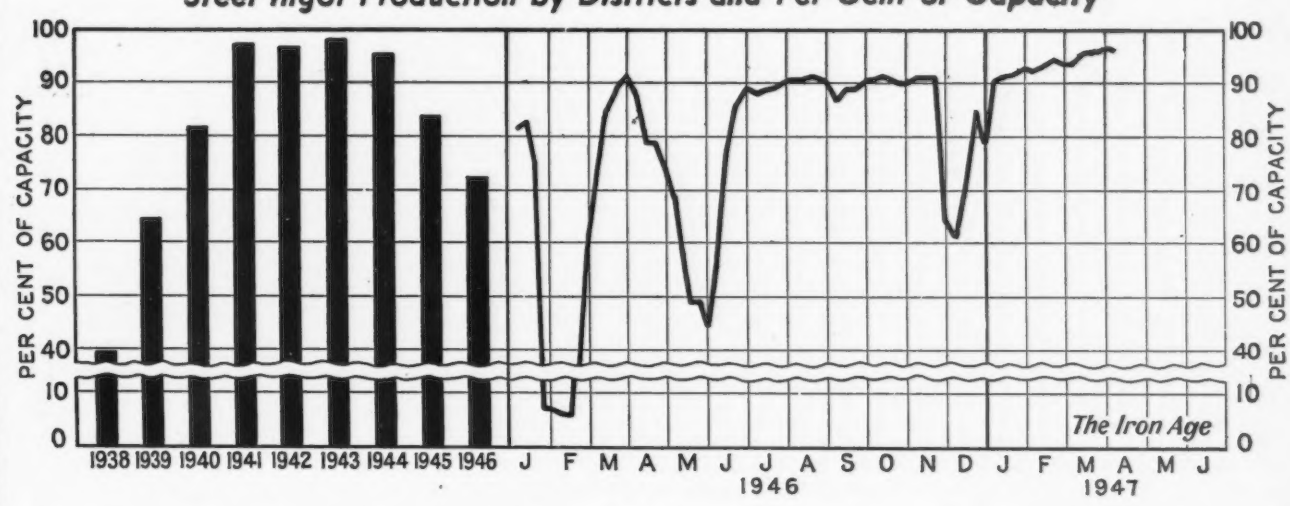
• **SPARROWS POINT BASING POINT**—Bethlehem Steel Co. will establish a Sparrows Point basing point for cold-rolled sheets when its cold mill gets into full production. It will first be necessary to expand hot mill facilities to provide coils for the cold mill. The present order position of equipment suppliers indicates that this may take a year. This change will mean that freight absorption for midwestern mills selling in the East will be a factor in competition when the cold mill begins shipments. It may also hasten action on U. S. Steel Corp.'s eastern plant.

• **POLISH TRANSPORT OUTPUT**—The output plan of the Polish metal industry provides for the construction during 1947 of 200 locomotives, 180 tenders, 250 railway coaches, 8500 railway trucks, 300 oil tankers, 1000 tractor trailers, 300 tractors, 1000 motorcycles and 60,000 cycles. Investments will be carried out in preparation for mass production of lorries.

• **BRITISH PRICES UP**—Price increases on hematite pig iron, some foundry pig, bright steel bars, and a few finished steel products have recently been announced by the British Ministry of Supply. Ferroalloys and high speed steel have been removed from control. Bright carbon steel bars have increased by about 4 pct and a number of adjustments on other products have been made to offset a recent increase in the price of spelter.

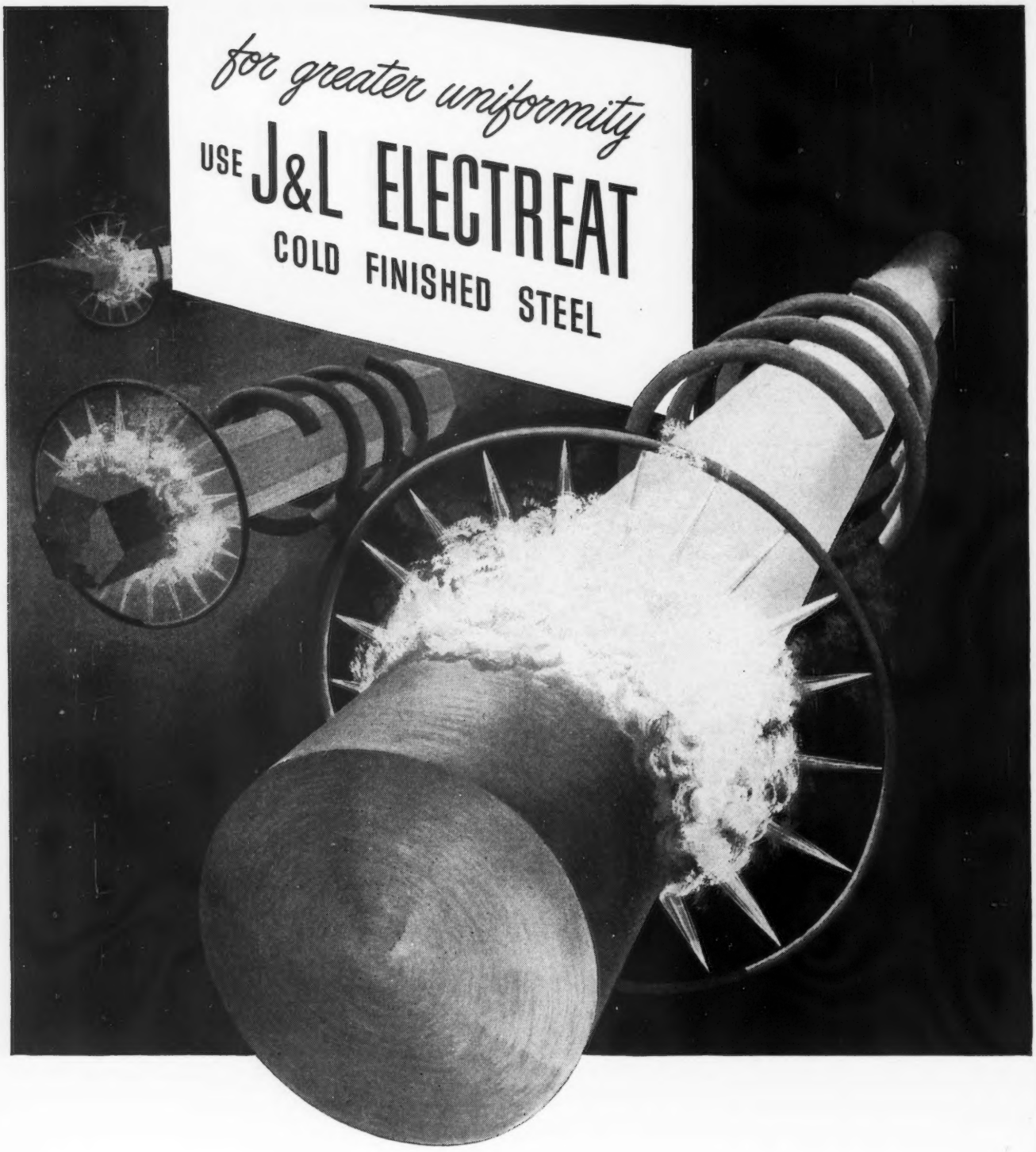
• **IRON ORE CONSUMPTION**—Blast furnaces in the U.S. and Canada consumed 6,264,284 gross tons of Lake Superior district iron ore in February, compared with 7,023,856 tons in January, according to the Lake Superior Iron Ore Assn. The report showed 24,316,980 gross tons on hand Mar. 1, at furnaces and docks compared with 30,514,072 a month ago and 33,647,260 on Mar. 1, 1946. Of the 193 blast furnaces depending principally on Lake Superior district iron ore, 168 U. S. furnaces and 8 Canadian furnaces were in blast. Idle furnaces numbered 15 in the U. S. and two in Canada. Plans for an Apr. 1 opening of lakes navigation were foiled early this week by one of the worst snowstorms in lower lakes history. Opening of navigation has been set back about 2 weeks as a result, but estimates of an 80,000,000 ton iron ore movement this season are thus far standing fast.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
March 26.....	101.0*	95.0*	91.0	90.0	98.5*	104.0	100.0	99.0	102.5	105.0	96.5	73.0	106.0	97.0*
April 1.....	102.0	95.5	92.0	90.0	100.0	102.0	100.0	99.0	100.5	110.0	105.0	77.0	107.0	96.0

* Revised.



The new induction heating method of producing heat treated quenched and tempered cold finished steel makes possible an unusually accurate control of the process. Bars are fed individually through the coil and heated to exactly the desired temperature. They pass immediately through a cone of water sprays which is used to closely regulate the cooling. The Electreat cold finished bars produced by J&L with this process have a degree of uniformity not possible with conventional methods. Write for complete information.

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION • **PITTSBURGH 30, PA.**

Federal Agencies Bring Steel Studies Into Sharper Focus

Probing of Most Studied Group By FTC, Commerce Dept., CPA More Intense

o o o

By GENE HARDY
Washington Bureau

o o o

Washington

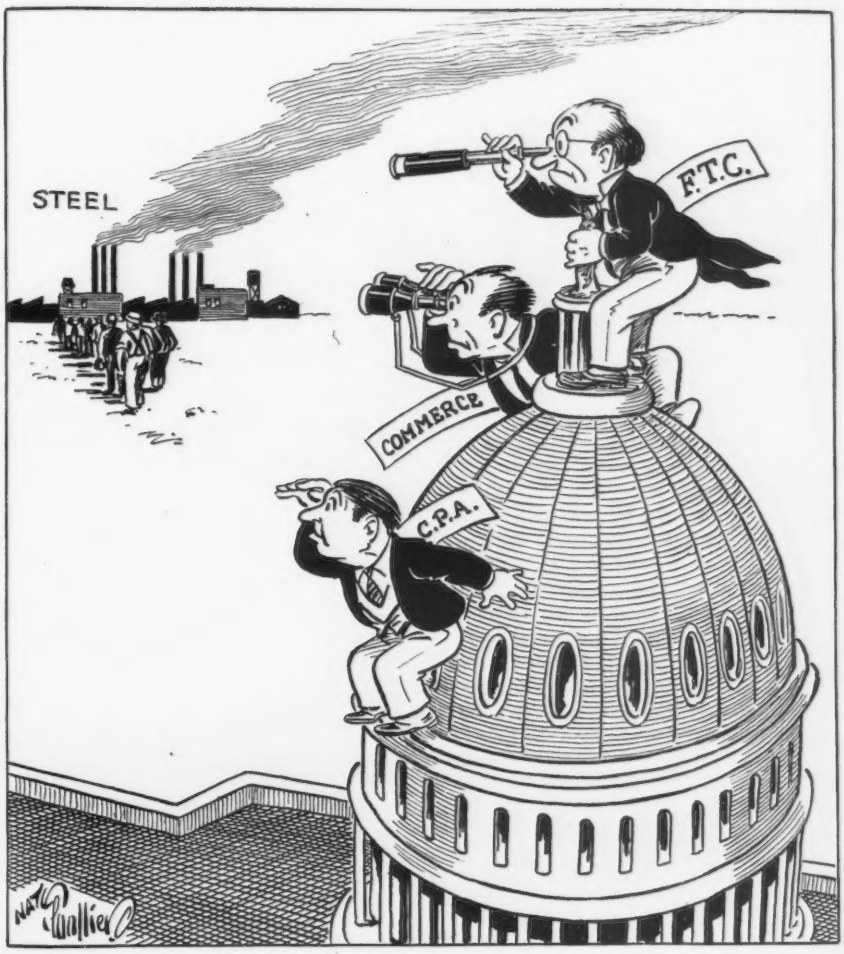
• • • **Studied and restudied** through the years by the various arms of government, the iron and steel industry is again being dissected by Uncle Sam's minions. Three departments—the Federal Trade Commission, Commerce Dept., and CPA, are busy on exhaustive studies of America's basic industry. The resulting mass of information will be reminiscent of the days of the voluminous TNEC documents, although the objective in the three current cases is considerably different from that of this earlier New Deal group.

The FTC study is an investigation of the current pattern of production and distribution and its effect on steel consumers. The widely battered Commerce study to be finished by the end of May, has turned out to be a factual report on the industry from its earliest days. CPA is attempting to get the wartime history of iron and steel on paper before its liquidation deadline.

The work of these three agencies will overlap in some respects, since some of the same basic information will be used. While the Commerce and CPA studies are historical, that of the FTC is concerned with immediate problems and for this reason is of greater importance.

The FTC study is part of the agency's work on basic raw materials, particularly those in short supply and in which there is a high degree of concentration of control. The recent report on copper (THE IRON AGE, Mar. 27, p. 109) was the first to be issued on industries which underlie the national economy.

The shortage of iron and steel and other basic materials is the Commission's primary concern.



What—Again?

Faced with the possibility of a continuing shortage during 1947, the Commission believes that there may be insufficient capacity in certain key industries, including iron and steel, to support a high level of national production. Other factors are also coming in for close scrutiny.

Taking the steel consumer's viewpoint, FTC is interested primarily in the problems that have arisen since the end of most government controls. Changes in the distribution patterns, changes in the product mix, current gyrations of the scrap market, changes in regional markets, acquisition of war-built facilities, acquisition of finishing facilities by durable goods makers; change in the pricing pattern, transportation rates, and government allocations are all being studied for their effect on steel consumers.

The study, which is under the supervision of the FTC Economic Div., is based on complaints from Congress and consumers, and information received from many sources. But most important, is the Commission's interest in the shortage of iron and steel from the standpoint of employment and the possibility of a recession this year.

FTC maintains that it is not a "witch-hunting" operation, but merely a portion of the Economic Div.'s study of national problems.

As part of its study on distribution, FTC is trying to get to the bottom of the current "gray market" in steel, but admits that, at the moment, it has little specific

data on the subject. THE IRON AGE surveys on this subject, it was said, are closely read by FTC personnel.

Should FTC, in its field work, explode the so-called "gray market," the question arises as to what could be done. FTC officials told THE IRON AGE that, in this regard, it was doubtful whether there was anything illegal in steel being handled by brokers with their offices in their hats and pyramiding of prices by these individuals—therefore, the only weapon at the command of the agency was the cold merciless eye of publicity, backed up with recommendations to Congress. Should FTC unravel this mystery there would be no qualms about identifying by name the individuals and companies involved.

This, in general, covers the immediate concern of FTC. On a long-range basis, FTC is primarily interested in determining whether iron and steel capacity is sufficient to support a continuing high level of employment.

A report of the Commission's findings and recommendations will be made to Congress, but a firm schedule for issuance of the report has not been worked out. However, there is every reason to believe that FTC will wind up its work on iron and steel within the next few months because of the urgent nature of some of the problems being studied.

Over at the Commerce Dept., a 300-page book on the iron and steel industry will be completed by the end of May. Factual in approach this encyclopedia will be available as soon as the Government Printing Office can get the presses rolling.

Originally, it was planned to include a portion dealing with the outlook for iron and steel covering long-term demand during the years 1947-60, based on past trends, national income, requirements of consuming industries and shifts in regional markets.

Commerce has now decided to drop this part of the project and all other attempts to peer into the crystal-ball.

While the work has progressed to the point where an actual deadline can be set, Commerce officials told THE IRON AGE that portions of the study are giving the agency considerable trouble—due in most cases to lack of adequate information. Included in this category are the portions dealing with investment; productivity per worker; efficiency of the industry in terms of output v. labor input; distribution by consuming industries; regional markets; and transportation costs as they affect distribution.

The following is a general outline of the Commerce study as it is now planned:

(1) Historical development of the iron and steel industry.

(2) Present structure of the iron and steel industry.

(3) Basic materials
  (a) Iron ore—reserves, quantity and quality; beneficiation; costs; foreign ores; effects of state taxation.
  (b) Coke — reserves; capacity; production; and consumption.
  (c) Limestone.
  (d) Scrap—supply; demand; pig iron - scrap ratios; prices and costs; foreign trade; government policy on exports.
  (e) Alloying materials.

(4) Location of the industry—raw materials; power and fuels; transportation; markets; and an analysis of major iron and steel centers.

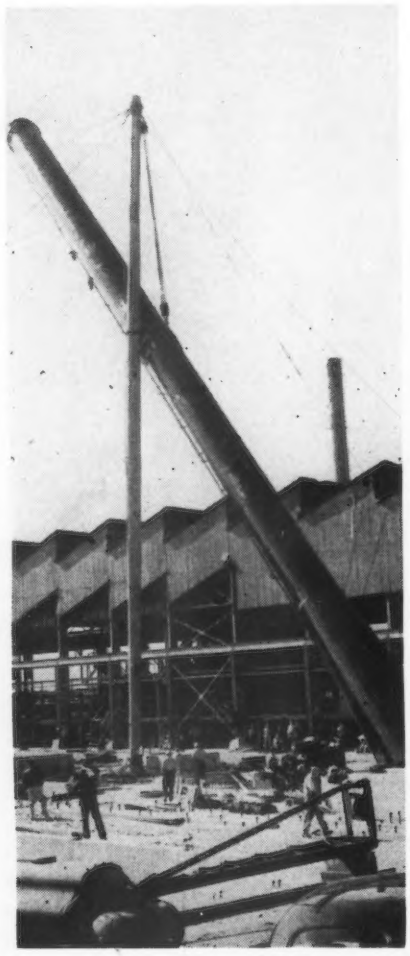
(5) Production of iron and steel —by type of product; by integrated, semi - integrated, and nonintegrated mills; by openhearth, bessemer, electric; capacity in relation to all the foregoing factors; rate of operation; and age of facilities.

(6) Consumption of iron and steel—by products; by consuming industries; by regional markets; and by seasonal markets.

(7) Finances — capital requirements; cost of operation; and price policies.

(8) Postwar developments in the iron and steel industries of foreign countries — shortages; capacities; technology of production; consumption; impact of nationalization and subsidies on the U. S. industry; trade barriers; and international cartels.

STRONG DRAFT: *One of two* 150-*ft stacks for the new soaking pits under construction at the Los Angeles plant of Bethlehem Pacific Coast Steel Corp. is put in its place. With an OD of* 6 *feet it will weigh* 256,000 *lb when brick lined. A new blooming mill and a combination high speed bar and rod mill is also going in here as a part of the company's* $10 *million expansion program.*



CPA'S big project consists of preparing a history of iron and steel during the defense, war and reconversion periods. Lack of funds and personnel, however, may prevent the agency from completing this work before the June 30 deadline. In this case, the material will revert to the National Archives.

CPA's immediate studies which covered forecasts of supply and demand, distribution of anticipated supplies, and other similar topics have been completed for a final report on the supply and demand picture of gray iron and malleable castings.

The last comprehensive report on iron and steel issued by CPA is the much hooted-at report of Jan. 7 which estimated the supply of steel for 1947 as approximately 11 pct short of requirements, or 60,900,000 tons against a demand of 66,989,000 tons.

Merchant Pig Iron Shipments Gained Sharply in Recent Months

Expansion in Production Took Place as Shortages Were Being Widely Claimed

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By TOM CAMPBELL
News-Markets Editor

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New York

• • • **In recent months** when the shortage of pig iron for merchant use was highlighted by the government and other sources, the shipments of this product were expanding at a rapid rate. An analysis of figures from the American Iron & Steel Institute shows that the portion of total pig iron production earmarked for the merchant trade was 22 pct higher in January of this year than in August 1946.

Apparently the so-called shortage during the second quarter of 1946 and during the last few months of that year were caused entirely by strike conditions over which the industry had no control. Indications are that pig iron production during March was at a much higher rate than it was even in January when blast furnaces operated at close to 91 pct of capacity.

Significant are the figures showing that while total pig iron production in January 1947 was only 3.7 pct above the best month in 1946, iron earmarked for the use by steel companies and ingot mold makers was up only 2 pct, contrasted with the 22 pct increase in the volume of shipments to the merchant trade.

Major difficulty facing the industry in an attempt to boost pig iron production during 1946 was the aftermath of the steel strike and the coal mine shutdowns. In general, many blast furnaces which were shut down because of these strikes were kept down for necessary repairs and relining.

For the first time in more than a year the steel industry is now able to have in production a maximum number of blast furnaces. All of these are in excellent condition and barring labor troubles the total production of pig iron should reach new peacetime peaks between now and the summer months.

PIG IRON DISTRIBUTION

May, 1946-January, 1947

Source: American Iron & Steel Institute

Compilation: THE IRON AGE

PIG IRON OUTPUT IN THOUSANDS OF GROSS TONS

MONTH	For Steel-making*	For Merchant Trade	Total
May—1946	1948	300	2248
June	2296	332	2628
July	4199	428	4627
August	4396	415	4811
September	4165	434	4599
October	4256	472	4728
November	3906	454	4360
December	3562	347	3909
January—1947	4480	508	4988
Percent change August 1946 to January 1947	2 pct	22 pct	3.7 pct

* This includes pig iron for "own use," for nonintegrates, steelmakers and for ingot mold makers.

While this increase in iron output has benefited steel companies by enabling a greater charge of iron in the openhearth, thus substituting for scrap, the trend for merchant shipments is also upward.

With the exception of December 1946 close to 10 pct of the total pig iron produced has gone to the merchant trade. These figures do not tell the whole story because total pig iron production has been moving steadily upward since last August. There is also evidence that steel companies, faced with slowdowns last year in blast furnace output because of strikes, sacrificed iron which would ordinarily be used for steelmaking in order to send as much as possible into merchant channels.

There is no chance over the next few months that pig iron users will obtain all the iron they want but there is a definite indication that allotments to them from total pig iron production will reflect a substantial increase over what they were getting a few months ago.

Last May when total pig iron production was only 2,248,000 tons the industry shipped about 13.5 pct into the merchant trade, keeping only 1,948,000 tons for steelmaking purposes. The same general situation was true last June. The same demand pattern which has been current in steel requirements has been true also in pig iron demand.

Blast Furnace Capacity and Production—Net Tons

	Number of Companies	Annual Blast Furnace Capacity	PRODUCTION							
			PIG IRON		FERRO-MANGANESE AND SPIEGEL		TOTAL			
									Pct of Capacity	
			February	Year to Date	February	Year to Date	February	Year to Date	February	Year to Date
DISTRIBUTION BY DISTRICTS:										
Eastern	11	12,551,280	845,926	1,733,076	24,994	51,320	870,920	1,834,396	90.4	90.4
Pittsburgh-Youngstown	16	25,042,040	1,771,465	x3,767,624	18,748	38,368	1,790,213	x3,805,992	93.2	94.0
Cleveland-Detroit	6	6,557,500	484,138	936,386			484,138	936,386	92.3	93.0
Chicago	7	14,097,710	959,548	2,011,394			959,548	2,011,394	88.7	88.2
Southern	8	4,924,670	285,526	639,430	9,569	19,213	295,095	658,643	78.1	82.7
Western	4	2,536,000	166,209	335,515	3,505	4,488	169,714	340,003	87.2	82.9
Total	36	65,709,200	4,492,812	x9,523,425	56,816	113,389	4,549,628	x9,636,814	90.3	90.7

Source: American Iron & Steel Institute

CPA Deplores Monthly Pig Iron Deficit of 50,000 Tons

Washington

• • • **With monthly output of pig iron** running about 50,000 tons short of foreseeable requirements for 1947, CPA in one of its final statements said that the overall industrial economy is threatened by the accompanying decline in castings.

While merchant pig iron production is about 7.5 pct below the 1941 rate, it was said, an increase of 4 pct in castings production is shown for the same periods which is explained by a stretching of available pig iron supplies in castings production, thus raising doubt as to how long a satisfactory quality in castings may be maintained.

These conclusions by CPA are drawn from field data and complaints made to the agency, plus a report by an official of the National Foundries Assn. to the effect that castings shortages might bring on a shut-down for some automobile factories until supplies improved.

CPA data show that monthly shipments of pig iron in 1941 averaged around 475,000 tons as compared with about 440,000 tons for the last quarter of 1946, representing a 7.5 pct decline.

At the same time, gray and malleable iron castings output in 1941 was about 12 million tons compared with 10.7 for 1946; 1947 production is back up to the 1941 rate. Backlogs for gray iron castings only stand at 3 million tons, roughly three months production.

Minimum requirements for 1947, according to CPA, are between 13.5 and 14 million tons of gray and malleable iron castings; this indicates a needed increase from 1 to 1.5 million tons over the 1946 fourth quarter rate.

Aside from the increase to 86 million tons of ingot steel indicated for 1947 on the basis of recent operating levels in the industry, the increase indicated in sheet and strip—to which castings are more closely related—is from 15.7 million tons to 19 million this year. This is a 20 pct increase against the reduction of 7.5 for pig iron, CPA points out.

"It seems fairly clear," CPA Commissioner John C. Houston, Jr., says, "that for some time we have been heading toward imbalance between pig iron, gray and malleable iron castings, and steel output. If the current situation is allowed to continue, it would appear that many large consumers will run into a situation where they will have to reduce steel consumption because of a shortage of complementary castings of satisfactory quality.

"The warning signals have already been raised by some industries which use both steel and castings," he adds. "It would appear that self interest would lead steel makers to make every effort to avert this situation by increasing their production of merchant pig iron."

Expiring Agency Sees Threat To Economy With Decline In Castings Output

Average Monthly Pig Iron Use
(In Tons)
Data by CPA

	1941	1947
Non-housing	307,000	238,000
Housing	124,000	157,000
Ingot molds.....	44,00	45,000
	475,000	440,000

Pig iron shipments for the average month of the first quarter 1947 were about 440,000 tons; for the average month of 1941, about 475,000 tons. The decline is concentrated in non-housing type items, a drop of about 23 pct.

Steel companies have sharply increased the proportion of pig iron shipments to the merchant trade. See p. 103 for actual data.—Ed.

CPA itself feels that very little more if any production can be expected from either plants which have been operating continuously or the high-cost furnaces which have been put back into operation by reason of subsidies on pig iron. Industry charges that both channeling of pig iron into soil pipe and the fuel situation attribute to the shortage. It is pointed out by industry members that 80 pct or more soil pipe content is pig iron and that much less is required.

A reduction in this percentage, it was estimated, could conceivably result in a recovery of up to 40,000 tons of pig iron monthly for the other industries. CPA has promised to concentrate on getting production expediters to work toward using more scrap in soil pipe manufacture.

Another major problem is fuel and it has been estimated that as much as 8 pct of pig iron loss may be due to poor coke. Much of this difficulty springs from slate and foreign matter as a result of machine mining operations and inadequate facilities for washing.

Estimates Building Costs In '47 to Hit $15.5 Billion

Washington

• • • **New construction** expenditures during 1947 will pass the $15½ billion mark, reaching its peak about September, at which time more than 2½ million workers will be engaged in building work, it is estimated by the Labor Dept.

If attained, this will be the greatest dollar volume than in any previous year in domestic building and 50 pct above the calendar year of 1946.

It should be noted, however, that the physical volume of construction will not increase at a proportionate rate this year since proportionate rate this year.

Lists Stamping Plants

Cleveland

• • • **To aid purchasing agents** seeking sources for stampings, the Pressed Metal Institute has published a list of its member plants. Manufacturers are listed alphabetically and by districts in two sections of the booklet. A third portion decribes the shop facilities and services available in approximately 100 stamping plants. T. J. Smith, Jr., executive vice-president of the institute, located in the Union Commerce Bldg., Cleveland 14, offers copies free to stamping users.

See 300,000-Ton Copper Surplus in Foreign Markets This Year

But U. S. Deficit Would Still Be 300,000 Tons Even If All Could Be Imported

o o o

By JOHN ANTHONY
Eastern Regional Editor

o o o

New York

• • • **It was revealed** here this week that observers of the world copper market are anticipating a copper surplus abroad this year in the neighborhood of 300,000 tons, mostly from the Belgian Congo and Northern Rhodesia. Foreign production has begun to improve as the result of the gradual recovery from the effects of the war, improved labor supply and better water supply. Assuming that the United States were able to import this entire surplus production, however, it would supply only half the anticipated deficit in requirements of 600,000 tons.

It is understood that Chilean producers are ready to divert to the United States about half their production as soon as the tariff suspension becomes effective. This should represent about 25,000 tons per month or the remaining 300,000 tons per year. However it is known that the British are attempting to obtain commitments for a portion or all of this tonnage.

Canadian production is estimated at 184,000 tons per year, of which it consumes about 60,000 tons and 75,000 tons goes to Great Britain, leaving very little for other consuming nations.

All domestic copper producers are agreed on the necessity for the suspension of the copper tariff, and even those whose mining and refining facilities are all located in the United States are agreeable to a year's suspension.

However, in the opinion of large consumer's of copper, a year's suspension of the tariff would be inadequate because most foreign producers are reported to be sold out for the second and third quarter of 1947 and would therefore be unable to divert any significant tonnage to meet domestic requirements during that time. Moreover, the big fabricators like the brass and wire mills must forecast their operations and requirements a long time ahead and cannot afford to depend on the possibility of an interrupted supply line at the end of a year. This is predicated on the probability of a Congressional summer recess for a national election when an extension is required.

Consumers foresee that when suspension of the tariff becomes effective, the domestic price must rise to the world market level which has recently been quoted at 22.75¢ f.a.s. New York. It is conceivable that the world price might rise even higher under the impetus of the added U. S. competition in world markets pending a realization of the anticipated foreign surplus production and barring a general recession in business.

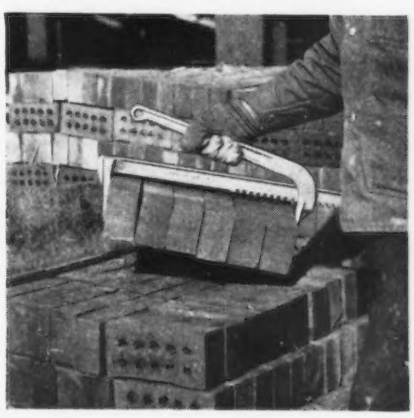
Copper producers are not happy over the present high price of the metal, as coupled with its shortage, it has already led to a flight from copper for certain applications where competitive metals can serve. The General Cable Co. has sent out telegrams to all customers recommending that they switch from copper cable to aluminum. This trend is expected to grow as the price goes higher and as galvanized steel products and fabricated aluminum becomes more readily available. A trend of this nature, while slow to begin due to the need for replacement of fabricating machinery and established fabricating techniques, once started may be continued when the copper market is quite different.

The Patterson bill calling for tariff suspension until Apr. 1, 1949, having passed the House, is now under consideration in the Senate Finance Committee. However Senator McFarland of Arizona has submitted a proposed amendment limiting the suspension period to Apr. 1, 1948 and specifying a maximum tonnage of 400,000 tons. This tonnage would not fulfill the needs of our expected deficit of 600,000 tons above domestic production. Moreover it would require, if passed by the Senate, a serious time loss for Senate and House Conference Committee.

Refined copper production last year was only 604,000 tons as compared with 843,000 in 1945. This drop was largely caused by the wave of strikes lasting from February to June at domestic mines, smelters and refineries. Although its effect was felt immediately by consumers, the fabricating industry is still suffering from the loss of tonnage represented by that period. Most deliveries to customers at that time came out of the government stockpile of foreign copper which at one time was reported at 600,000 tons. Now government reserves of copper are practically exhausted.

The current shortage of copper has been aggravated by the absence during the last 3 months of any buying negotiations abroad by the government or private interests, the latter being handicapped by the tariff from concluding purchase contracts. However, it is significant that there have been some small purchases of foreign copper by the automotive industry and by fabricators whose production will be sold abroad to permit recovery of the tariff payments under drawback arrangements.

LIGHT WORK: *New lightweight magnesium brick tongs are now being fabricated and merchandised by The Dow Chemical Co.'s Specialty Products Div. at Bay City. The weight of the tongs is 2¼ lb. Tension spring and tooth gears permit adjustment for all types of bricks and insure safe handling.*



Raise Fence Posts And Nail Galvanized Extra

Pittsburgh

• • • **A 50¢ per 100** lb increase in the galvanizing extra charges on galvanized nails has been made by three of the major producers, American Steel & Wire Co., Bethlehem Steel Co., and Jones & Laughlin Steel Corp. On a base price of $3.75 a keg, the extra on nails 15 gage and heavier becomes $2.75 a cwt, up from $2.25 a cwt. On nails under 15 gage, the extra is increased from $2.75 a cwt to $3.25 a cwt.

Bethlehem Steel Co. announced also that it had increased the price of fence posts by adding eight columns to the present column listing of 82. This makes the price of fence posts at Pittsburgh 90 columns. American Steel & Wire Co. has based fence posts on 90 columns at Duluth for some time past, but the company indicated that there is no intention at present to change this price. The increase of 8 columns in the fence post price means, roughly, an increase of about $8 a ton in the delivered price of this commodity.

British Raise Aluminum

London

• • • **The British Minister** of Supply has announced that as from Mar. 24 the price of virgin aluminum in ingot or notch bar form will be increased from $291 to $320 per long ton delivered into consumers' works.

The new price will apply to metal of a purity of 99 pct to 99.5 pct inclusive, with premiums as follows for higher purities: Purity 99.6 pct, $352 per long ton; 99.7 pct, $368; 99.8 pct, $388; 99.9 pct, $520; 99.99 pct, $720.

Two Premium Plans Remain

Washington

• • • **Termination on** Mar. 31 of subsidy payments for manufacture of wire nails reduced premium payment plans for building materials from a peak of 11 to only two. These are for merchant pig iron and cast iron soil pipe which are scheduled to expire on June 30.

Meanwhile, Housing Expediter Frank R. Creedon has notified the RFC that only $65 million of the original $400 million authorized for such payments will be required for the program which was initiated last summer to speed the production of housing materials.

In effect, this represents savings of $335 million, which will be turned back to the Treasury.

Of the $65 million utilized by the housing program, Mr. Creedon said that about $15 million will have been used for building access roads to lumber supplies and the remaining $50 million for premium payment contracts.

Columbia Steel Co. Will Spread Freight Savings

San Francisco

• • • **To spread freight** rate reductions as far as possible, Columbia Steel Co., U. S. Steel Corp. West Coast subsidiary, made the following announcement recently:

"The reduced freight rates which go into effect midnight, Mar. 31, between Geneva, Utah, and West Coast points are predicated on a minimum of 80,000 lb loading of cars. In order to make available to as many customers as possible savings to be realized from these rates, Columbia Steel, U. S. Steel West Coast subsidiary, is notifying its customers that carload orders from less than 80,000 lb will be shipped in combination cars with other shipments unless the customer specifies otherwise."

Tin Picture Is Not Bright

Washington

• • • **The 1947 outlook** for tin is not as optimistic as it was 3 months ago, according to a statement made by CPA to the tinplate industry advisory committee on Mar. 31. Revised figures estimate the supply of new tin at about 69,000 tons. This means that tinmill producers will have to reduce their inventories by about 1500 to 2000 tons if they are to process the 32,000 tons needed for such products this year.

The meeting, called at the industry's request, was also told that under the extended controls on tin the powers exercised under Orders M-81, M-43, and Dir. 10 to M-21 would be continued in substantially the same form as will the tinplate export program. In regard to exports, it was reported that the industry is about 30 days behind on shipments licensed by the Office of International Trade.

The committee also requested a review of existing restrictions on the use of hot dipped tinplate. It is believed that if these were eased the demand on electrolytic plate might be reduced.

"Times Are Tough All Over"

Washington

• • • **"Shanghai's living costs are more than 4400 times those of the 1937 base period. In Chungking food and other necessities through May 1946, soared 2300 times over 1937. The United States figure, in November 1946, was 48 pct above 1937. Japan was up 48 times, or 4800 pct, Rome 19 times, France 9 times, and Indo-China 20 times.**

"Extreme inflation in Hungary raised Budapest prices through May 1946 to 235,795,000 times those in August 1939, with food at 399,993,000 times up, in terms of the Hungarian pengo."

—U. S. Dept. of Labor, Int. Labor Office Report

Lifts Some Export Controls

Washington

• • • **Aluminum sheets,** plates and strips, iron bars 1 in. and under, fabricated structural iron and steel shapes (beyond mill forms), and tin cans were among a group of products on which export controls were lifted by the Office of International Trade, effective Apr. 1.

Also freed from control were portable steel buildings, cooking and heating stoves (except electric), warm-air furnaces, domestic oil-fired boilers, space heaters (except electric), unit heaters and parts, nonfluorescent electric interior lighting fixtures and parts, temperature controllers and parts, sinks and other plumbing fixtures (except lavatories and wall lavatories), electric domestic water heaters and parts, tractors and concrete block machines.

Robert Littlejohn Sets Next Spring as Date For Liquidating WAA

Washington

• • • Concluding its first year as the overall domestic surplus property disposal agency, Administrator Robert M. Littlejohn has predicted that one more year will see the end of WAA. By that time, he said, inventories will have been reduced to the point where they can be taken over by old line government agencies.

Despite the incurable energy with which Mr. Littlejohn has attacked the job of liquidating war surpluses and the progress it has made, it is an ambitious goal which he has set for the agency.

Exclusive of about $5 billion in undeclared property, the disposal of which depends upon congressional decision as to the peacetime military program, there remains a known total of $13 billion in surpluses which must be disposed of by next March if WAA is to go out of business at that time.

When WAA took over all domestic disposals in March 1946, less than a half-billion dollars worth had been disposed of and the inventories had mounted to $12 billion. In the ensuing 12 months, a recapitulation by WAA shows that the inventories are down to less than $9 billion, monthly sales have soared to about $1¼ billion, and approximately $15 billion worth has been sold.

However, Mr. Littlejohn recognizes that the hardest part probably lies ahead. Helping to boost the total sales over the past 12-month period have been numerous real property sales ranging in value from $50 million to $150 million each; the most desirable of such facilities have already been taken over by industry.

WAA's Administrator is not unaware of the difficult job he has set for himself and his agency in setting next spring as its liquidation date. In voicing the forecast, he said:

"Having supplied billions of dollars worth . . . to meet postwar needs which private industry is now filling, we are faced with an increasingly difficult job in finding markets. However, although surplus is becoming increasingly harder to sell with a consequent decline in dollar return, we intend to keep running with the throttle wide open."

Clayton Stresses Need Of U. S. for Increased Raw Material Imports

Washington

• • • In a vigorous defense of the Reciprocal Trade Agreement program before the House Ways & Means Committee, Under Secretary of State Will Clayton declared that the United States needs more imports of raw materials if it is to keep up present production and eventually more outlets for manufactured goods.

Mr. Clayton, who heads the U. S. Delegation to Geneva, declared that the chief aim of the proposed program was to minimize and reduce governmental interference with this foreign commerce as carried on by private traders.

While our surpluses now are principally agricultural, he said, the time will come when expanding American production will have met domestic demands and must seek foreign markets; our access to these will be largely controlled by the accessibility of our own.

Instead of hurting domestic economy, he held that the United States needed even more imports. Now coming in at the annual rate of $5 billion, they are strengthening the domestic economy with needed raw materials and an even greater amount is needed to keep up the present rate of production.

A Two-Way Pipeline

Washington

• • • "We are now absorbing imports at the rate of $5 billion annually. Far from injuring our domestic economy, these imports are strengthening our industries with essential raw materials. At its present tempo, our economy could absorb a much greater volume. If that tempo is speeded up and our industries continue to expand . . . we definitely must have larger foreign markets for the enormous surpluses we produce. . . . We need a vigorous, expanding two-way foreign trade as an extension of a dynamic domestic economy."

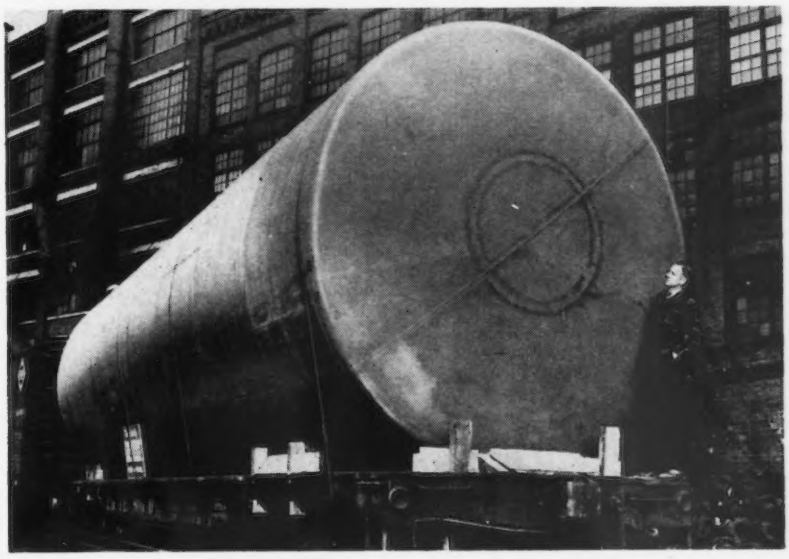
—WILL L. CLAYTON, *Under Secretary of State, House Ways & Means Committee, Mar. 26, 1947.*

Show Engineering Progress

Philadelphia

• • • Said to be the first time that national manufacturers have gathered together specifically to show the progress in engineering, the Franklin Institute and the Juniors of the Engineers Club of Philadelphia are holding an Engineering Progress Show from Apr. 5 through 13.

ACID HOLDER: *This 50,000-gal muriatic acid storage tank en route to a midwestern chemical plant is lined with 1½ tons of rubber. While B. F. Goodrich officials state that larger tanks have been rubber lined in customer's plants, this is said to be one of the largest ever lined and shipped by Goodrich.*



National Steel Corp. Earnings Report Asks Federal Tax Revision

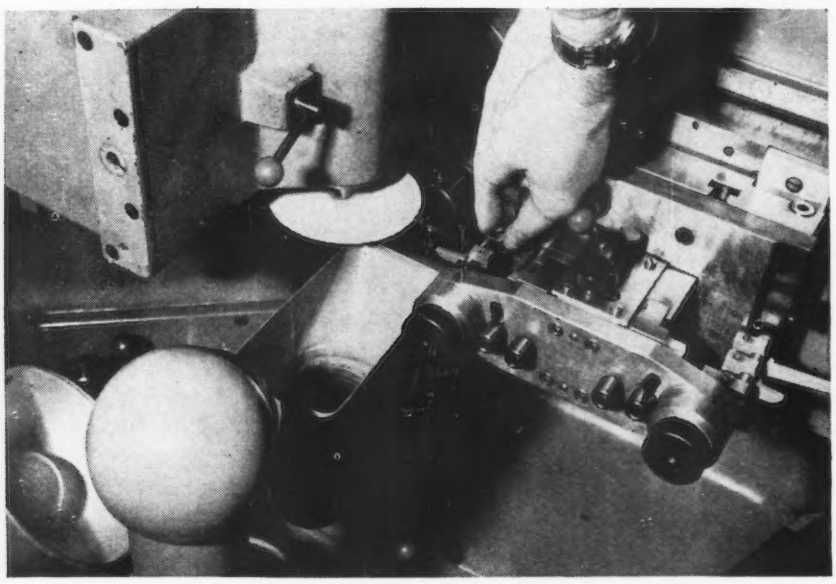
Pittsburgh

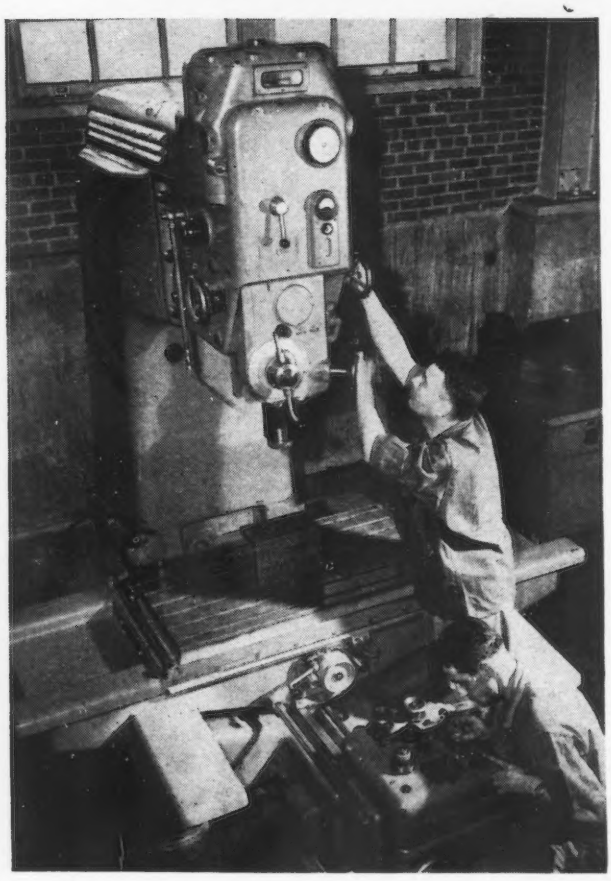
• • • "The principal reason for increased net earnings in 1946," said Ernest T. Weir, board chairman of National Steel Corp., "is not to be found in the higher prices for steel products, but rather in lower federal tax rates and the absence of large nonrecurring items." In submitting the corporation's annual report, Mr. Weir expressed the opinion that federal tax laws should be revised to recognize the fact that replacement cost of equipment which can only be depreciated at original cost is today much higher than original acquisition cost.

With constructive action by Congress on legislation affecting labor relations, taxation and the cost of government, Mr. Weir forecast continuing good business and fair earnings by industry over the balance of 1947.

He pointed out that property additions which cost the corporation $27 million last year would normally be valued at about $19 million over the period of their operation. Elaborating on depreciation, the report stated that in actual practice replacement costs of facilities are greatly in excess of original costs, particularly since technological advances require larger and more expensive equipment and a recommendation that federal tax regulations on depreciation be amended accordingly.

National Steel's net earnings in 1946 were $20,461,651, equal to $9.17 per share on 2,230,642 shares, which compares with earnings in 1945 of $11,117,764, or $5.04 per share. Total sales in 1946 were $239,764,320, comparing with sales in 1945 of $271,832,560, the highest in the history of the company.





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GERMAN TOOLS IN U. S.: *These machines are part of an exhibit of captured German machine tools running during April at the Frankford Arsenal, Philadelphia. Above is a projection form grinder. It uses an optical projector transmitting an image to a scanning screen where the worker follows the pattern. Vent in foreground is an air suction tube to keep working parts clean and prevent interference with the machine's optical system. The machine at the left is a Lindner jig borer, controlled by an optical and a hydraulic system which position the borer to within* 0.001 *mm.*

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WAA Lists 15 Wartime Surplus Installations Ready for Disposition

Washington

• • • War Assets Administration has listed 15 additional wartime installations declared surplus by owning agencies.

Some are listed by names of the wartime operators and should not be confused with privately-owned properties. They are:

Lake Ontario Ordnance Works (2326 acres) Youngstown, N. Y.
Wabash River Ordnance Works (4.9 acres) Newport, Ind.
Boeing Airplane Corp. (Plancer No. 139, 180 acres) Wichita, Kan.
Swapco-156, Wichita Engineering Co., Wichita Falls, Tex.
Consolidated Shipbuilding Corp., Morris Heights, Bronx, N. Y.
John H. Mathias Co., Camden, N. J.
North Basin Iron Ore Mine, Linden, Tex.
South Basin Iron Ore Mine, Jacksonville, Tex.
J. S. Abercrombie & Harrison Oil Co. (Plancer No. 880) Sweeny, Tex.
Tonkawa Prisoner of War Camp, Tonkawa, Okla.
Camp Hann, Riverside County, Calif.
Walker Army Air Field, Walker, Tex.
Sopchoppy Bombing Range, Walkulla County, Fla.
Housing Project, U. S. Highway No. 12, Prairie Du Sac, Wis.
Camp Bowie, Brownwood, Tex. (116,658 acres).

Weekly Gallup Polls . . .

Growing Number Believe Russia Is Out to Dominate the World

Princeton, N. J.

• • • **The decision** of President Truman and Secretary of State George Marshall to intervene in Greece, thus precipitating a showdown with Russia, has a significant relation to the atmosphere of American public opinion today, according to George Gallup, director, American Institute of Public Opinion.

Public belief that Russia is out to try to dominate the world has increased sharply as compared to a year ago.

When Under-secretary of State Dean Acheson declared recently that Russia is following an aggressive, expansionist policy, Moscow became indignant. But Mr. Acheson's statement closely mirrors the sentiments of the American people as a whole.

From coast to coast interviewers for the institute have just tested sentiment on a two-part question. The first part was as follows:

"Do you believe any nation or nations would like to dominate or run the world?"

A poll on this same question was conducted a year ago. A comparison of results follows:

	March 1946 Pct.	Today Pct.
Yes	59	65
No	27	24
No opinion	14	11

In the second part of the question voters who replied in the affirmative to the above were asked: "Which nation or nations?"

When the results are compared with those of a year ago, a marked rise in the number saying Russia is found.

	March 1946 Pct.	Today Pct.
Russia	39	52
Britain	19	9
Germany	15	10
Japan	9	3
United States	3	5
Others	2	2
All big nations	2	1
No opinion	1	3
	90	85

Because some people named more than one country the two columns add to more than the number who gave a "yes" answer to the first question.

The new turn which our foreign policy has taken in Greece bears close relation to the attitudes of the public concerning Mr. Marshall as Secretary of State.

When Mr. Marshall took office the institute queried voters across the continent on whether he should try to follow the general policies of James F. Byrnes, former Secretary, regarding Russia, or whether he should follow a firmer policy or a softer policy.

The vote came out unmistakably against any softening of American policy toward Russia. A total of 19 pct thought that the State Dept. policy prior to Marshall was satisfactory, while 51 pct wanted a firmer policy, making a total of 70 pct expressing opposition to any relaxation of attitude. Only 5 pct wanted a softer policy and the rest no opinion.

The Greek issue, however, has many ramifications. Are the American people willing to go as far as Mr. Marshall and President Truman want to go in supporting Greece?

Opinion on the new turn which our foreign policy has taken is now being sounded by the institute in a coast-to-coast survey.

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• • • **The American people** show a good deal of sympathy with the plight of Germans suffering food shortages.

Herbert Hoover reported recently that the condition of the German people had "sunk to the lowest level . . . in a hundred years," and that relief must be arranged quickly. His statements made a notable impression on the American people.

A coast-to-coast survey by the institute finds two out of every three voters—a sizable majority—saying that they have heard or read about Mr. Hoover's report.

Voters Approve Shipping More Food to Germany in Wake Of Hoover's Recent Report

o o o

When all these were asked what they thought of the report, the weight of sentiment was in favor of sending more food to the Germans.

The poll questions were as follows:

"Have you heard or read about Herbert Hoover's report to President Truman on food conditions in Germany?"

	Pct.
Yes, have heard	67
No, have not	33

Those who indicated that they have heard or read about the report were asked: "What is your opinion on Mr. Hoover's report?"

The opinions given showed a sizable margin in favor of carrying out Mr. Hoover's suggestions. The point of view of the largest group was typified by the comment of a Chicago minister interviewed in the poll. He said:

"It was a good report. We should carry out his proposals. We have a moral and humanitarian obligation to feed our former enemies and, besides, if we permit chaos to continue in Germany, there's no telling where it might lead."

That general view is concurred in by six in ten of the people who say they have heard or read about the Hoover report.

Opinions opposed to Mr. Hoover's recommendations were expressed by about three in ten. These felt that stern treatment should still be meted out to the Germans. Their viewpoint is typified in this comment, from a San Francisco lawyer:

"I thought Mr. Hoover's report was exaggerated. He wants too much done for the Germans. After all, they made millions suffer from hunger when they were top dogs. We shouldn't give them

(CONTINUED ON PAGE 160)

War Born Whyalla Is Booming Key Town in Australian Industry

Once a Mere Ore Shipping Port It Now Has a Shipyard And Blast Furnace

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By JOHN LOUGHLIN
Canberra, Australia

o o o

Whyalla, Australia

• • • **Well off the beaten** track near the top of Spencer's Gulf where the sea laps the shores of saltbush plains, a new and lusty child of Australian industry, the iron town of Whyalla, is tackling big enterprises today. It is building the largest ships yet to be made by Australia's infant shipbuilding industry. They're 12,500-tonners for the iron ore run.

Whyalla is the outstanding addition to Australia's center of heavy industry. It was created as part of the industrial scaffolding that had to be built to carry the stresses of World War II. It is one of those legacies Australians have in mind when they talk of the vastly expanded industrial capacity left over to them to turn to the uses of peacetime.

Heavy industry in Australia has clung in the past mainly to the chief sources of coal in the eastern State of New South Wales. Iron ore from the rich deposits in the country back of Whyalla was shipped by Broken Hill Proprietary Co., Ltd. to its east coast steel centers — Newcastle and Port Kembla—at the rate of 2,000,000 tons a year. Whyalla was the port of shipment, nothing more, its population steady at 1200.

Today as the Douglas airliner drops over the gulf to this remote spot, the skeleton structures of slipways cradling partly built ships, and the bulky silhouette of a $3,250,000 blast furnace, the sixth of the steel organization's blast furnaces, rise into view on the threshold of the desert. An orderly well-planned town is laid out around Hummocky Hill, a town inhabited now by 7500 people, mostly the 2200 workers on the payroll of Broken Hill Proprietary and their families. We wanted to see how Australia's newest stronghold of industry, brought into existence by the war, was serving the nation in peace.

We found the clamorous song of Whyalla's industrial effort still taking its rhythm from the shipyards where riveters and platers worked on the hulls taking shape in four of the five 600-ft slipways. They have in hand a shipbuilding program that would provide jobs for many more skilled workers if they could be found. A labor shortage was one of its major problems. A thousand men were working in the yards which were capable of employing twice that number.

Two of the ships under construction were 6000-ton freighters for the Australian coastal trade. Two were 12,500-tonners of the new Yampi class, especially designed for the B.H.P. fleet to be used in the exploitation of vast ore deposits at Yampi Sound off the northwest coast of Western Australia. With more ships of the same class they will carry ore from Yampi to the east coast industrial center.

At a fitting-out wharf served by a 150-ton revolving cantilever crane stood one of three 2500 tonners built this year for the coastal trade—trim little vessels with such large and comfortable quarters for the crew that they looked more like passenger ships.

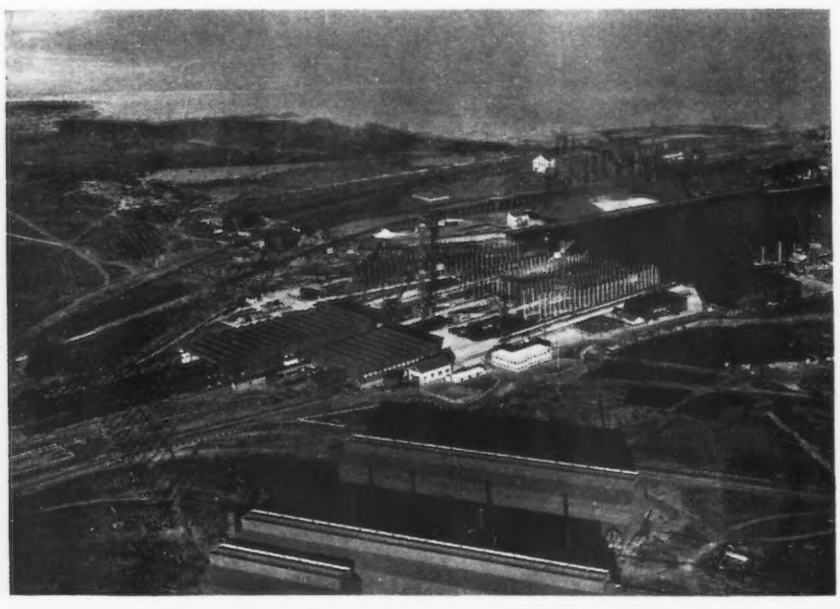
Handy to the berths were the workshops—a 400-ft by 160-ft shop for rolling and punching the plates and bars for the ships' hulls, the shipwrights and riggers' shops, the joiners' shops, the fitting-out shops with their blacksmiths, electricians, plumbers, engineer-fitters, welders, sheetmetal workers, boiler assemblers, painters and dockers.

"The only part of shipbuilding not carried out here yet is the construction of engines, but we are going to do that here too," said the shipyard superintendent, sitting at his desk in the administrative building.

Allan Dalziel is that highly exportable brand of Scot that makes good in any corner of the earth, easily becomes a cosmopolitan, but loses none of the flavor of his ripe accent.

A momentary pang of homesickness though, nearly lost Australia a fine shipbuilder, the fu-

SHIPS TOO: *This aerial view shows the town's shipyards and blast furnace. Whyalla is now an important part of the new industrial structure that is Australia's legacy from the war.*



ture builder of the Whyalla shipyards.

The burly Scot came to Australia in the *Clan Campbell* 20-odd years ago as its third officer. When Broken Hill Proprietary Company bought the ship he was the only man who went over with her.

"When I realized what I was doing I suddenly felt homesick," he recalled. "I wrote out a message to my captain telling him I'd changed my mind, and took it to the Newcastle post office. Then I stood on the steps and had it out with myself. I finished up by tearing up the message."

Before going to sea, Allan Dalziel, a native of Dumfries Shire, Scotland, had a sound training on the Clyde as a shipbuilder and marine engineer. With this useful experience behind him, he became the company's marine superintendent at Newcastle.

They selected him to establish the new shipyards at Whyalla when it was decided to build them there for strategic reasons.

"We imported five or six Scottish higher technicians to help us to get started," said Mr. Dalziel. "Otherwise we began with Australian workmen, and only a few tradesmen at that. Many of them were raw from cattle stations and farms, so raw that we had to put up notices to tell them where the bow and stern and port and starboard were. We had to train them with the handful of skilled men we had.

"In spite of our labor shortage, we have built 14 ships since 1940 —four local defense vessels (corvette type) for the Royal Australian Navy, two 8000-tonners for the company's service, five 9000-ton freighters for the Australian Shipbuilding Board, besides the three 2500-tonners just completed.

"We have in hand now four 12,500 ton ore steamers and four 6000-ton cargo ships. You've seen two of each on the slipways."

When the shipyards of Whyalla were busy on their first vessels, the substantial project of building the 100-ft blast furnace was completed. They started in 1938 to reclaim a site from the sea for it. They had to scoop out 2,250,000 yd of silt from the seabed to make a harbor for steamers to berth beside the furnace, and the silt was used to build up the 75-acre site for the furnace on the mangrove covered tidal flats.

Construction of the blast furnace was on standard lines, the hearth brickwork enclosed in a rugged cast steel segmental cylinder, and the junctions between the segments made by means of steel links shrunk over lugs projecting on the outside of the segments. The furnace was blown in on May 26, 1941, and Whyalla began to make pig iron in addition to shipping ore to the Eastern States.

We sought out the blast furnace superintendent, R. C. Irving, and found him, a slight man in his fifties, wearing a battered hat and overalls, among a shift of men tapping a firy stream of molten iron from the furnace.

The Whyalla furnace, he explained, makes between 4000 and 5000 tons of iron a week. To make a ton of iron at Whyalla, they used 2200 lb of coke, 3200 lb of iron ore, 600 lb of limestone, and 6500 lb of air.

Mr. Irving has been with blast furnaces most of his life. "A lot of things can go wrong with them," he says. "They have their eccentricities. A blast furnace is like a woman. It can be temperamental. It has to be watched."

At the wharf alongside the furnace we watched a company ship unloading coke from the ovens at Newcastle, a British ship taking on iron ingots from the Middle East, and another vessel loading ore for the Eastern States.

Since the first jetty was built on the coast at Whyalla during the first World War, 30,000,000 tons of iron ore have been shipped away from this desolate coast to supply more than 90 pct of Australia's requirements.

A single track railway links the port with the ore deposits at Iron Knob. It heads inland for 34 miles over the mulga and saltbush plains and stops in a fantastic region of iron mountains.

The jagged outline of Iron Monarch, its original symmetry altered by open-face workings, rises above the horizon as you drive along the road flanking the railway. Ore winning operations were transferred to Iron Monarch after most of the high grade ore had been taken from Iron Knob, the first iron mountain to be worked, but the solitary little township lying at the foot of the Monarch is still called Iron Knob.

When the Iron Monarch's resources too, have been exhausted, there still remain the deposits in the rest of the Middleback Ranges, of which it is part, extending over 20 miles. The ore is mainly hematite, an oxide of iron of a high degree of purity. It contains varying proportions of man-

IRON MONARCH: *Main workings of the iron mountain called Iron Monarch. There are two large crushing plants, each of which delivers crushed ore through a separate shaft to a conveyor belt which runs down the side of the hill to a storage bin at the rail level.*

ganese with an extremely high average of more than 60 pct.

To see the workings you drive up a winding road cut into the iron flanks of the Monarch. In the sunshine everything on this mountainside seems to be bathed in weird faint plum-blue light, the rocks, the few miserable shrubs that cling to the inhospitable surface soil, your car, your own clothing, reflected seemingly from the iron ore dust lying in a thin coating everywhere.

The open face method of working the iron ore is to slice it off the mountain, layer by layer. Each layer is 100-ft deep. So when we stand on the upper level, what remains of the original mountain peak stands 100 ft above us. Other levels have been cut into the mountain lower down. The grades of ore vary in different parts of the mountain. It happens that that segment of the peak is almost 80 pct manganese.

They're about to take another big bite out of the peak. Four hundred pounds of explosives have been charged into holes drilled in the working face. We crouch in a shelter with the foreman and watch a tiny figure come to the edge of the cliff and signal that he is about to fire the charges.

There's a heavy muffled explosion. A huge piece of the cliff bulges outward, opens lazily like a flower blooming, and collapses to the level in a vast black billowing of dust.

Electric shovels load the ore into 30-ton side tipping trucks. Electric locomotives haul the trucks to the primary crusher. Lumps of ore of up to eight tons are crushed between giant nutcrackers to a size of 10 in. Secondary crushers reduce them further to 4 in. ready for shipping.

Safety measures are such a fetish on the open faces that accidents are rare. They call the ambulance that stands in the garage at the workings, the "Stork Express" because its main use is to carry expectant mothers from Iron Knob to the maternity hospital at Whyalla.

Down in the tiny dusty township of 600 inhabitants you look in vain for any likeness to the usual tough mining town.

The men who work on the ore faces are mostly family men—the town's average is four children to the family. Out in this desert township they live tranquil ordered lives in their neat little cottages.

They aren't even the robust drinkers you'd expect them to be, claims the top level foreman. I remember him countering our looks of incredulity by pointing out five of a dozen men working nearby.

"They don't touch it," he said.

Card parties are the most popular pastime, bridge and poker mainly. They have a dance on Friday nights in the Institute Hall, and film shows once or twice a week. On Wednesdays and Saturdays the women take a bus to Whyalla to shop. On Sundays some of the families have a day at the seaside at Whyalla.

Apart from these visits to the coastal town, the hard working ore winners whose vital role is to provide most of the raw materials for Australia's iron and steel, are happy to stay at their end of the single track ore line.

WAR BABY: *Whyalla's blast furnace was built during the latest war. It produces 4000 to 5000 tons of iron a week from ore mined 34 miles inland.*

Norwegian Company To Erect Pig Iron Plant For Mysore in India

Oslo, Norway

• • • **An agreement** has recently been signed between the Mysore Iron & Steel Works, Mysore, India, and Elektrokemisk A/S, Oslo, Norway, providing for the latter to design and erect an electric pig iron plant consisting of two Tysland Hole furnaces, each of 13,000 kva capacity. The Indian company has also assigned Elektrokemisk as purchasing agents for plant equipment. Elektrokemisk will, furthermore, be responsible for the initial starting up of the plant.

The Mysore Iron & Steel Works already operates an iron and steel plant at Bhadravati on the Shimboga railway in Mysore.

The existing works include a blast furnace of conventional design with a production capacity of 50 tons per day. The new addition of two electric smelting units, which is estimated to be completed within 3 years, will raise the pig iron output by some 200 tons per day.

The ore to be smelted is stated to be a mixture of hematite and limonite, containing approximately 58 pct Fe. Charcoal will be employed as reducing agent.

John Miles & Partners, Ltd., London, are acting as consultants for the extension of the existing steel plant, raw material handling plant, etc.

Britain Concludes Trade Agreement with Belgium, Luxemburg

London

• • • **A trade agreement** has been reached between Belgium and Luxemburg on one hand and the United Kingdom on the other which will p a r t i a l l y alleviate Britain's steel s h o r t a g e. The agreement, as predicted, calls for the delivery of 103,000 tons of steel from the Continental countries, but instead of immediate deliveries (see THE IRON AGE, Mar. 6, p. 104) this tonnage will be spread over the next 12 months, starting from April.

Probably the most important factor in the agreement is the fact that it specifies that a second long-term agreement is to be negotiated in the very near future, which will provide for the delivery of substantial tonnages of Belgian and Luxemburgian semifinished and finished steel to Britain over the next few years. Best guesses here are that the agreement may cover from 3 to 5 years' business.

The factors involved in the horsetrading of a decent price to Britain for steel in today's seller's market, and Belgium getting in return the assurance of an outlet in a buyer's market, are well known (see THE IRON AGE, Mar. 6, p. 104). Under the circumstances, several things may be reasonably assumed from the Belgian willingness to enter into such an arrangement.

Calls for Delivery of 103,000 Tons of Steel Extending Over Next 12 Months

o o o

Being s h r e w d international steel merchants, not averse to making profits, the Belgo-Luxemburgian combine would not enter into a long-term agreement with Britain if there were a reasonable gamble of being able to dispose of the material at today's sky-high export prices. Thus it seems evident that as far as the Continental operators are concerned they are beginning to see the signs of the end for the seller's market.

The evidence is unmistakable. British unwillingness to pay exaggerated prices is well known. The Continental producers will not enter into a long-term arrangement at a lower price until they are certain that such a contract represents the best possible business proposition. There is no altruism involved on either side.

From the British standpoint, as indicated, it may be assumed that if the long-term agreement is to be completed, then the exporting countries have agreed to modify their hitherto a d a m a n t price stand. It is understood that the price level agreed for the tonnage for the next 12 months is roughly equal to 50 pct above British prices. This would represent a substantial concession on the part of the Belgians, and would almost certainly be somewhat below the Belgian selling price in any other market.

There is some possibility that the Luxemburg i n d u s t r y will benefit to a greater extent than was expected from the agreement. First information was that the tonnage would be split about

Summary of United Kingdom Steel Statistics

Source: British Iron & Steel Federation

All Figures Thousands of Net Tons	STEEL			PIG IRON	SCRAP	IRON ORE	
	Ingots and Castings	Finished Deliveries	Steel Stock (1)	Production (2)	Steelmaking Consumption	Imported Ore Consumption	Home Production
1944 Total	13599.0	11502.4	2431.5	7542.0	8252.6	2725.6	17332.2
1945 Total	13237.8	9992.3	1885.9	7959.4	8065.9	4494.7	15870.4
1945 December	992.3	735.6	1332.4	651.8	592.7	449.7	1036.6
1946 January	1025.0	971.0	1370.9	803.6	754.8	541.5	1373.6
February	1107.5	833.2	1341.5	654.5	657.2	445.5	1147.3
March	1145.5	898.6	1314.7	659.9	695.2	484.2	1148.6
April	1129.4	827.0	1265.1	666.1	682.7	499.0	1090.8
May	1466.0	1139.0	1283.6	846.7	890.9	644.5	1371.4
June	1074.3	859.2	1266.3	678.7	640.1	531.7	1010.2
July	1012.9	791.1	1299.8	658.5	616.0	534.9	986.9
August	1265.0	968.2	1342.7	813.6	755.4	665.8	1252.1
September	1068.4	930.4	1329.2	659.9	648.7	530.4	1027.2
October	1424.1	1170.9	1236.3	872.4	860.2	707.3	1289.1
November	1181.3	933.4	1196.7*	689.4	716.8	570.3	993.2
December	1058.6	832.3	1167.7	686.3	644.6	563.1	970.8

(1) Held by producers and in British Iron & Steel Corp. stockyards at the beginning of the years and months shown.
(2) All qualities, including ferroalloys.
* Revised.

60-40, with the Luxemburg industry handling the smaller portion. The exact split is yet to be determined but it may develop into a nearly even split.

There was pressure from both sides during the negotiations with respect to the amount of the agreed tonnage which would be composed of semifinished material. The British representatives were anxious that all the material be semis, while the producers were hoping to sell as much in finished steel form as possible. The final percentage will be determined on a quarterly basis, but it is expected to work out at about 50-50 over the 12-month period.

No product breakdown has yet been made, but negotiations for this breakdown for the first 3-month period are under way at present.

Although it portends the weakening of the international steel market, this agreement certainly does comparatively little to salvage the British steel import picture for 1947, and comparatively less to the overall British steel famine. Six weeks of negotiations have obtained 103,000 tons, and 6 simultaneous weeks of fuel and transport shortages have probably cost ten times that amount in steel lost.

Thus Britain's need for semifinished steel imports grows even greater as time passes. The increasingly embarrassing problem of hard currency shortages makes the tonnage from the Continent the more welcome, as Britain can ill afford to buy steel at any price when it must pay in Canadian or American dollars.

With this aspect of the problem in mind, one of the most promising aspects of the trade agreement is the clause which states that Britain is to benefit in imports from any increase in production in these two Continental countries during the next 12 months. It is not made clear how much of any increase will go to Britain, but any amount at all will be manna.

This possibility is particularly interesting as both Belgium and Luxemburg are operating at 50-75 pct of capacity due to the shortage of coal. In a large measure, this is not a shortage of their own coal production, but a shortage of imports from the Ruhr coal mines. In the final analysis the British military government decides how much Ruhr coal is going to be available to export in any given period. Thus, if the authorities controlling Germany choose to increase the export of Ruhr coal, the British steel industry and the British economy in general may tend to benefit in increased exports of coal from Belgium.

It seems certain that over the next year the exports of coal from Germany to its Western neighbors will increase for a number of reasons. Political pressure from France, Belgium and Luxemburg may force the issue. The exports were cut last October on the promise that they would be reinstated this spring. Coal production in the Ruhr is going up, so there will be a bigger pie to cut. The expected increase in availability of Polish coal should also tend to make it possible for the level of operations in the steel industries to be increased.

The expanding exports of American coal should have a long-range effect as well in improving the overall coal picture. All of these factors assume that the governments of Belgium and Luxemburg will choose to allocate more of the coal they may receive to the steel industry. Although it is by no means certain that allocations will be increased for steel pro rata as overall supplies are increased, it is likely that a substantial overall improvement will not be effected without increasing steel production.

Coming Events

Apr. 7 Packaging Machinery Manufacturers Institute, semiannual meeting, Philadelphia.
Apr. 7-10 National Assn. of Corrosion Engineers, convention, Chicago.
Apr. 8-11 American Management Assn., packaging exposition, Philadelphia.
Apr. 9-12 Southern Machinery & Metals Exposition, Atlanta.
Apr. 14-16 National Machine Tool Builders' Assn., spring meeting, Atlantic City, N. J.
Apr. 14-17 Electrochemical Society, Inc., Louisville, Ky.
Apr. 21-23 American Institute of Mining & Metallurgical Engineers, openhearth, coke oven, blast furnace and raw material committees, annual conference, Cincinnati.
Apr. 28-29 American Zinc Institute, annual meeting, St. Louis.
Apr. 28-May 1 American Foundrymen's Assn., convention, Detroit.
Apr. 29-May 1 Industrial Packaging and Materials Handling Exposition, Industrial Packaging Engineers Assn. of America. Chicago.
May 5-6 National Welding Supply Assn., convention, Philadelphia.
May 6-10 Society of the Plastics Industry, Inc., exposition, Chicago.
May 15-17 Society for Experimental Stress Analysis, annual meeting, Chicago.
May 21-22 American Iron & Steel Institute, annual meeting, New York.
May 26-27 Assn. of Iron & Steel Engineers, annual spring conference, Philadelphia.
May 27 Metal Powder Assn., spring meeting, New York.
June 2-4 American Gear Manufacturers, Hot Springs, Va.
June 9-11 American Coke & Chemical Institute, annual meeting, French Lick, Ind.
June 15-19 American Society of Mechanical Engineers, semiannual meeting, Chicago.
June 16-20 American Society for Testing Materials, annual meeting, Atlantic City, N. J.
June 17-19 Machinery Dealers National Assn., convention, Cincinnati.
June 23-27 American Electroplaters Society, industrial finishing show, Detroit.
July 14-18 American Society of Civil Engineers, Duluth, Minn.
Aug. 25-29 National Assn. of Power Engineers, Inc., Boston.
Sept. 8-12 Instrument Society of America, conference, Chicago.
Sept. 10-12 Porcelain Enamel Institute, Inc., Columbus, Ohio.

British Sell Tools

London

• • • **A British Ministry** of Supply campaign is being conducted to bring to the notice of the small plants that 40,000 surplus machine tools are available for purchase.

The ministry has already disposed of over 110,000 machine tools for $112 million.

The London ECONOMIST

The Tough Line

Reprinted by special permission to further understanding on how political and economic affairs are viewed in London.

° ° °

TEN days have passed since President Truman, standing before both Houses of Congress, launched his $400 million rocket in the direction of Moscow. General Marshall, who presumably knew it was coming, was equalled in composure by his fellow Foreign Ministers, who did not. They must be congratulated — especially Mr. Molotov—on resisting the temptation to disperse and take cover, or at least to show themselves nervous and irritable in their set debates on Germany.

In the conference room they have held with admirable tenacity to the problem they came to discuss; how much they will talk together off the record remains to be seen. But their first reaction was the right one; Mr. Truman's rather melodramatic gesture was neither so significant nor so dangerous as it sounded. It takes a Senator Taft to ask for an official opinion whether there is risk of immediate war as a result. There quite obviously is not.

There are, however, circumstances in which another such speech, followed by the arrival of an American task force in the Eastern Mediterranean, might be as inflammable as was Emperor William's use of his cruisers. It contained bold and far-reaching words, the full significance of which can hardly be estimated until the Greeks and Turks have spent the dollars and received some of the advisers, supplies and equipment for which Congress has been asked.

About Greece, Truman said that the situation is one "requiring immediate action;" about Turkey, that its integrity "is essential to the preservation of order in the Middle East." He was fully aware, he said, of the "broad implications involved" if the United States helped these countries. It should be done "primarily through economic and financial aid," which he would not recommend "except that the alternative is much more serious." (Both the President and the Secretary of State had already explained privately to leading Congressmen their view of the alternative.)

Then, in broad terms, recalling the forgotten Atlantic Charter: "Totalitarian regimes imposed on free peoples, by direct or indirect aggression, undermine the foundations of international peace and hence the security of the United States." Those who point out that all this had already been many times said by President Roosevelt forget that he was speaking either to a nation at war or to governments that seemed bent on war. President Truman spoke to a world in which the only great Powers are allies; it was the timing and the manner of his declaration that were disturbing, not its content.

THOSE who fear the Americans as enemies will find nothing worse in the speech than the phrases quoted; those who fear the Americans as friends will find them challenging enough. The former will comfort themselves, the latter perplex themselves with this thought: That if the President of the United States has to use such solemn tones and such bold claims to persuade Congress to lend money and send advisers to the Greeks and Turks, then the American people have not begun to understand the international responsibilities claimed for them.

If they have to be roused to half-measures of foreign policy by speeches claiming world leadership, how many speeches will have to be made, how many dangerous challenges thrown out, to maintain their support for an army of occupation in Germany, to say nothing of a Four Power Pact stretching into the next century?

THE speech before Congress can hardly be separated from the speech delivered in Texas 5 days earlier; it raises the same questions about the relation between American claims and American performance. In Texas Truman urged his countrymen to realize that their political relations with other countries could not be separated from their economic relationships, that their economic policy must be above party, that they could lead the world to economic peace by accepting the rules of the international trade organization proposed by their State Dept. and by preparing to receive larger imports from abroad.

The first paragraphs of the speech were grandiose: "We are the giant of the economic world. Whether we like it or not, the future pattern of economic relations depends on us." "We can lead the nations into economic peace or we can plunge them into economic war." Only towards the end came the sober assurances that "tariffs will not be cut across the board," that "freer trade not free trade" would be the slogan, larger markets the objective.

Truman did not mention the escape clause which each American tariff agreement must contain, or the new procedure and public discussion on tariff agreements which the Republicans forced on him as the price of a bipartisan trade policy. He could no more be expected to draw attention to these strings on his economic policy than he could be expected to draw attention in his speech before Congress to the fact that conscription for military service ends 10 days hence.

But the British bystander, as he watches the economic giant feeling his biceps, has to persist in his questions. How far is the State Dept. ahead of the American people as it plans and defines their political, strategic and commercial commitments? Are they dropping behind, or are they being taken along at a pace which will leave them weary 5 years hence? Do they understand what they are talking about when they interpret their President to mean that Britain has

(CONTINUED ON PAGE 157)

British Are Given First Real Analysis of Coal "Crisis"

Trade Board Head Discloses Nation Was Not Crippled Despite Serious Cuts

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By JACK R. HIGHT
European Editor

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London

• • • **Sir Stafford Cripps,** President of the Board of Trade, speaking at a recent press conference in London, brought up to date the current "crisis" situation, and released data which demonstrated the effect of the fuel and electricity dislocations on the British economy. The official statistics on the unemployed indicated that two and a half million workers were laid off, and that many more were put on short time or otherwise affected.

Sir Stafford pointed out that since the economic debate there has been a great deal of discussion in the press and a number of points have been raised which call for further information from the government.

The statistics he presented gave the British people for the first time a quantitative analysis of the effects of the crisis. The accompanying chart shows the violent effect of the fuel cuts on unemployment. At the peak count of Feb. 22, total unemployment in Great Britain was nearly six times the figure 6 weeks earlier. By Mar. 5 it had dropped again to twice the earlier figures, or a total of just over 800,000, of whom nearly half were temporarily laid off. Allaying the fears of some people who imagined that industrial life in the country had come practically to a standstill, the figures show that even at the peak only about 15½ pct of the total number of insured workers was unemployed.

The figures do not cover short time working and other dislocations which have been larger than the percentages Sir Stafford mentioned as to unemployment.

The interruption in power and fuel supplies had a most serious effect in reducing output and dislocating the economy. What the President of the Board of Trade tried to show was where to go from here. He dealt in some detail with the fuel shortage and its effects on industry, because it is the need of fuel that is today the prime factor in reduced British production.

If Britain had unlimited coal supplies there would be no difficulty in disposing of at least 25 pct more than present output.

This real requirement is far beyond what is practically possible in existing circumstances and in its efforts to make ends meet Britain has for a long time had to deny British coal to almost all export customers and to limit deliveries to household consumers. After doing the e two things and taking credit for some other expedients such as conversions to oil burning, Britain is left with a minimum essential requirement of about 200 million long tons for the year. This 200 million tons has been set as the target for British coal production in 1947. That does not, of course, mean that it is regarded as a ceiling.

The forecast of production during the coming 6 summer months was 89 million long tons (equivalent to about 180 million tons during the coal year). This was a forecast of what would happen if matters remained as they were at the time of the economic debate, and it showed a need for securing an additional 20 million tons in order to meet the year's target.

To meet that target Britain can expand production, can import—if it can get imports, substitute other fuels, cut requirements, or use a combination of all these expedients.

One sure way of expanding production will be to increase the number of miners at the face, and very encouraging progress is being made in this line as a result of hard work over the last 18 months on recruitment. Britain ended up last year with 692,000 men on the colliery books and was experiencing a loss of more than 1000 a week. Yet during the first 9 weeks of this year, in spite of losses, the number of workers on the colliery books was increased to over 700,000. If this rate can be maintained the number of miners on the colliery books will reach the year-end target of 730,000 by October.

This more rapid rate of manning the industry would go some way towards bridging the gap between the previous forecast for the summer months (on the basis of 180 million tons) and the government's minimum target of 200 million tons in the year as a whole. Pressure on recruitment

MOTHERS GET LOOK-SEE: *British mothers of prospective coal miners see for themselves what conditions their sons will work under. The trip was arranged by the national Coal Board. Here they are getting ready to go down Ashington Pit, near Newcastle in northern England.*

is not only being maintained but intensified. In order to encourage the flow of recruits various measures have been taken to increase the provision of houses and of a number of consumer goods in the mining areas.

The next way of expanding supplies is to get more output per worker. The first need is to get a good understanding between the miners and the National Coal Board so that full production can be built up. The introduction of the 5-day week, the beginning of concentration on the more productive pits, the mechanization program and other developments are about to start. The mineworkers have assured Britain that they will reach the 200 million ton target, but Sir Stafford emphasized that to do this they will need the best possible support from the rest of the community, and particularly all kinds of machinery and supplies for collieries and miners must have first priority.

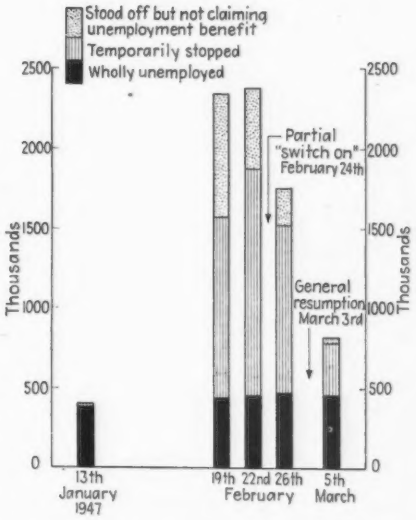
Conversion from coal to oil fuel is another valuable way of filling the gap, and there is no more useful and patriotic duty today than to hasten this conversion, especially for those making oil tanks and equipment.

Regarding the possibility of importing coal into Britain, he said that in view of the desperate shortage of fuel in Europe it would obviously be better to try to arrange for other countries to supply some of Britain's few remaining export commitments, such as bunkering depots abroad, before bringing overseas coal into the country. It was hoped that South Africa would be able to help by finding supplies for bunkers and other limited export demands which would otherwise have to be met from Britain.

To the extent that all these measures do not bridge the gap, any deficiency could only be met by further economies and cuts. An immense effort will be required, not only to get Britain safely through next winter, but to rid it of the nightmare of acute coal shortage for future years and to lay the foundations for getting all the coal and power needed for both home consumption and export.

Sir Stafford went on to say that there seemed to have been some misunderstanding in parts of the press regarding the explanation

UNEMPLOYMENT DURING THE PERIOD OF ELECTRICITY CUTS



he gave recently in the House of Commons concerning the fuel position on industrial activity. He had pointed out then that when all the other users had been cut to a minimum, industry had to get what was left, and that for the 6 summer months the forecast supplies left for iron and steel and coke ovens and for all other industries had been 17.6 million long tons for current use apart from stocking. The actual deliveries to industry during the summer months will be at a higher rate than the amounts allowed for current consumption, but part of these deliveries must be earmarked for winter stocks, and each firm would be responsible for seeing that these stocks were held for next winter. The forecast which he gave the House of Commons allowed for a current consumption of exactly two thirds of the total estimated requirement if industry were to be run at capacity. In order to run at full blast our industry needed an extra 8.8 million tons during the summer months, and to meet this need Britain required a 10 pct increase in production above the estimate.

Some people had misread this as meaning that industry would have to run through the summer at only two thirds of full capacity. He said that, as he had previously explained, Britain must plan on a fair estimate and not on a target figure. If the estimate is achieved and nothing more, full industrial production could not be attained, but if as it hoped output rises above the estimate, any increase there is will mean more for industry. The mineworkers have pledged themselves to do their part, and provided they make an all-out effort it should be possible to provide industry with enough coal to operate at a reasonable level. The government will see that all possible help and priorities are given to producing and distributing fuel for essential purposes.

Sir Stafford hoped before long to be able to give some indication of the level of supplies which industry can anticipate and how it will be allocated, but said that whether these supplies come forward or not depended on the miners. Meanwhile plans would be made between the government and industry concerning the best way of allocating the 17.6 million tons for current use to get the maximum output while maintaining a proper balance in industry.

Power Shortages Cut Industrial Production In U. S. German Zone

Washington

• • • **Fuel and power** shortages combined to delay and even stop a great deal of industrial production in the U. S. Zone of Germany during February and the early part of March, the American Military Government has reported.

Despite the continued upward production of coal which has reached a daily rate of nearly 270,000 metric tons in the Ruhr and the French Zone overloaded rail transportation facilities because frozen waterways have forced coal stockpiling.

As a result, rolling mill output has declined because of a lack of semifinished steel from Maxhuette where openhearth furnaces are still out of production. Late in February, the blast furnace at Luitpoldhuette also was closed down until exhausted coke supplies are replenished.

During the period, Schweinfurt's two ball bearing plants worked only night shifts in order to take advantage of the off-peak power period; the closed down ball bearing plant at Cannstatt is still inoperative.

Industrial Briefs . . .

• ROCKET PUMPS—Pumps which may permit rocket speeds of 4000 miles an hr are now being built by the Pesco Products Div. of Borg-Warner Corp., in Cleveland. Three special types of pumps have been developed. A pressure loaded gear pump for turbo-jet missiles incorporates a special feature which makes it operatable on gasoline without any lubricants, thus permitting use at high pressure. An ultra high speed centrifugal type pump permitting large flows under moderate pressure is being made for use in ramjets. The rocket pumps are specifically designed for pumping of liquid oxygen, hydrogen peroxide and alcohol.

• NEW PLANT — The Ohlen-Bishop Mfg. Co., Columbus, manufacturers of saws and edge tools, has under construction a new factory and office building, estimated to cost in excess of $1 million. The buildings will be constructed of steel and concrete. Contracts have already been awarded for the purchase of specially designed furnaces, dry kilns, machinery and appliances.

• INSTITUTE APPOINTMENT — Benj. Harris, president, Non-Ferrous Ingot Metal Institute announces the retirement of R. D. T. Hollowell secretary-manager for the past 20 years, and the appointment of Isadore Glueck, formerly sales manager, Federated Metal Div. of American Smelting & Refining Co. as secretary-manager of the institute effective Apr. 1, 1947.

• NEW FOUNDRY ADDITION—Garden City Foundry Co., Stoughton, Wis., has plans completed for a $50,000 addition to its present building which will include new office quarters.

• ELECTED DIRECTOR — L. M. Crow, Jr. has been elected to directorship of the Clearing Industrial Assn. of Chicago. Mr. Crow is president of Met-L-Wood Corp.

• APPOINTS DEALER—The Boye & Emmes Machine Tool Co., Cincinnati, has appointed the Rudel Machinery Co., Inc., New York, as their exclusive dealer in the New York and Hartford territory.

• SCRAP COMPANY — Organization of Herbert Freedman & Co., with headquarters in Cincinnati has been announced. The company will deal in structural steel and ferrous and nonferrous scrap.

• OPENS OFFICES—Jack Yauger & Co., manufacturers agents for metal building products, have opened offices at 1908½ Second Ave., S. Birmingham.

• PHILADELPHIA OFFICE — The American Brake Shoe Co., has opened offices in Philadelphia at 1500 Walnut St.

• BATTELLE APPOINTMENT—Robert H. Frazier, formerly a metallurgical engineer with the National Tube Co., has been appointed to the staff of Battelle Institute, Columbus, Ohio, where he will be engaged in research in steel processing.

• TO BUILD TRAMWAY — Completion of plans for erection of a 10 mile long monocable aerial tramway paralleling the main ridge of the Andes Mountains in Peru, have been announced. This tramway has been designed and furnished by the John A. Roebling Co. for the Cerro de Pasco Copper Corp.

• OPENS TERRITORY—The Ladish Co., Cudahy, Wis., has established a new district office in Atlanta, to serve the southeastern territory with a complete line of forged fittings. The new office will be located at 452 Spring St., N.W., in Atlanta.

• KEY MAN AWARD—Jess Toth, of the Harry W. Dietert Co., Detroit, was selected as the recipient of the "Key Man" award by the Detroit Junior Board of Commerce.

Grinding Firms Charged With Fixing Prices Of Wheels and Abrasives

Washington

• • • **The Grinding** Wheel Manufacturers Assn. and five corporations have been charged by the Dept. of Justice with fixing prices of grinding wheels and other abrasives in violation of the Sherman Antitrust Laws. Attorney General Tom C. Clark, on Mar. 26 announced the filing of civil action in the U. S. District Court in Boston.

Wendell Berge, Assistant Attorney General in charge of the Antitrust Div., says the complaint charges that the defendants have met from time to time at the association and agreed upon uniform list prices and rules for determining list prices. It also charges that they have agreed upon discounts to be used in the computation of final selling prices, agreed upon arbitrary classifications for determining the applicable prices and discounts, and by means of the merchandising committee of the association have policed and enforced the pricing system and prices agreed upon.

The complaint seeks to have the association dissolved; to enjoin the defendants from further agreements fixing prices, discounts or customer classifications; and to require the defendant manufacturers to make such changes in their pricing system as will be necessary to restore competition to the industry.

The defendants in addition to the association are as follows: Norton Co., Worcester, Mass.; The Carborundum Co., Niagara Falls, N. Y.; Bay State Abrasive Products Co., Inc., Westboro, Mass.; Simonds Abrasive Co., Philadelphia, and Macklin Co., Jackson, Mich.

Twenty-six other members of the association are named as co-conspirators. The Dept. of Justice says the defendant companies and co-conspirators produce approximately 95 pct of all abrasives manufactured in the United States.

Construction Steel . . .

New York

• • • **The estimated total** bookings of fabricated structural steel for the month of February 1947, according to the American Institute of Steel Construction, Inc., amounted to 124,436 tons, some 22,000 tons larger than the bookings for the previous month. The estimated total for January and February was 226,305 tons, or an increase of 11 pct over the average of 203,858 tons booked in the same months in the averaged 5 prewar years 1936 to 1940.

February shipments totaled 123,148 tons, a slight decrease from January, but some 39 pct greater than the averaged February shipments in the 5 prewar years. The tonnage available for fabrication at Feb. 28 amounted to 655,776 tons.

Following is the complete tabulation of bookings and shipments:

	Estimated Total Tonnage for the Entire Industry 1947	Estimated Total Tonnage for the Entire Industry Avg. 1936-1940
Contracts Closed		
January ..	101,869*	107,578
February ..	124,436	96,280
Totals ...	226,305	203,858
Shipments		
January ..	129,387*	92,578
February ..	123,148	88,626
Totals ...	252,535	181,204
Tonnage available for fabrication within the next 4 months.	655,776	304,277

*Revised.

• • • **Fabricated steel awards** this week included the following:

4750 Tons, Midland, Pa., hot and cold strip mill building for Crucible Steel Co. to American Bridge Co., Pittsburgh.

3500 Tons, Fort Wayne, Ind., transmission towers for Indiana and Michigan Electric Co. to American Bridge Co., Pittsburgh.

2000 Tons, Alta Vista, Va., board plant for U. S. Gypsum Co. to Bethlehem Steel Co., Bethlehem, Pa.

1285 Tons, Smith Bluff, Tex., grease plant for Pure Oil Co. to Mosher Steel Co., Houston.

1000 Tons, Birmingham, municipal football stadium enlargement, to Virginia Bridge Co., Birmingham, through Algernon Blair, Montgomery, Ala., contractor.

400 Tons, Marcus Hook, Pa., Congoleum Nairn Co., to Belmont Iron Works, Philadelphia.

280 Tons, Philadelphia, Schmidt Brewery Co., to Morris Wheeler & Co., Philadelphia.

245 Tons, White Eagle, Okla., Power plant, Kansas City Structural Steel Co., Kansas City, Kans.

245 Tons, Missouri Basin Project, Wyo., penstocks and accessories for Kortes Power Plant, Bureau of Reclamation, Denver, Spec. 1611, to Darby Products of Steel Plate Corp., Kansas City, Kans.

240 Tons, Jamestown, N. Y., Jamestown Metal Equipment Co., factory building, to Warren Construction Co., Jamestown, N. Y.

180 Tons, Texas, transmission line and substation for Gulf States Utilities Co., to Orleans Material & Equipment Co. through Stone & Webster Engineering Corp., Boston.

170 Tons, Lancaster-Chester Counties, Pa., Pennsylvania Dept. of Highways, bridge, to American Bridge Co., Pittsburgh.

135 Tons, Araby, Ariz., structural steel for Gila Substation, Parker Dam, Bureau of Reclamation, Denver, Spec. 1616, to Emsco Derrick & Equipment Co., Los Angeles.

120 Tons, Philadelphia, boiler plant for Scott Paper Co. to Bethlehem Fabricators, Inc., Bethlehem, Pa.

100 Tons, Atlanta, Ga., warehouse for Westinghouse Electric Co., lamp division, to Southern Steel Works Co., Birmingham, through Henry C. Beck Co., Atlanta, contractor.

100 Tons, Atlanta, Ga., warehouse for Pittsburgh Plate Glass Co., to Southern Steel Works Co., Birmingham, through Henry C. Beck Co., Atlanta, contractor.

• • • **Fabricated steel inquiries** this week included the following:

9000 Tons, Tulsa, Okla., 40 mile 20 in. pipeline for Colorado Interstate Gas Co.

4350 Tons, Port Arthur, Tex., ten storage tanks. This project abandoned.

4000 Tons, Newark, N. J., Automotive parts Chrysler Corp., Detroit.

3000 Tons, Philadelphia, building for Yale & Towne Mfg. Co.

2300 Tons, Joliet, Ill., addition to Public Service station.

1750 Tons, Port Natchez, Tex., oil storage tanks. This project abandoned.

1400 Tons, Chicago, addition to university of Illinois hospital.

730 Tons, Northfield, Ill., Willow Road grade separation.

700 Tons, Crandall, Tex., Texas Highway department.

400 Tons, Norristown, Pa., Schmidt Brewery Co., through Turner Construction Co., Philadelphia, bids in.

300 Tons, Savannah, Ga., 30,000 kw power plant for Savannah Electric Co., Stone & Webster Engineering Corp., Boston engineers.

300 Tons, Baton Rouge, La., 30,000 kw power plant for Gulf States Utilities Co., Stone & Webster Engineering Corp., Boston engineers.

235 Tons, Bellwood, Ill., housing project.

200 Tons, Madras, Ore., 96 in. pipe U. S. Bureau of Reclamation.

200 Tons, Milford, Del., theater, Apr. 3.

175 Tons, Grant County, Wis., Spec.S-0137-2 T-0203-2.

150 Tons, Richland, Iowa, Keokuk County Highway bridge S-930-2.

150 Tons, Milwaukee, factory building for Milwaukee Envelope Co. This project abandoned.

120 Tons, Cambria County, Pa., Pennsylvania Dept. of Highways, bridge, for rebidding Apr. 11.

100 Tons, Spartanburg, S. C., tank supports for International Metals & Chemical Co. This project abandoned.

• • • **Reinforcing bar awards** this week included the following:

300 Tons, St. Cloud, Minn., Teachers College to Hagstrom Contracting Co.

300 Tons, Birmingham, municipal football stadium enlargement, to Connors Steel Co., Birmingham, through Algernon Blair, Montgomery, Ala., contractor.

• • • **Reinforcing bar inquiries** this week included the following:

3500 Tons, Philadelphia, City of Philadelphia, filtration plant.

575 Tons, Coram, Calif., reinforcing bars U. S. Treasury Dept., San Francisco, Inv. SF-382847.

200 Tons, Watertown, Mass., cold storage plant.

145 Tons, Santa Barbara Co., Calif., reinforced concrete bridge east of Park Place and Rancheria St., California Div. of Highways, Sacramento, bids to Apr. 23.

140 Tons, Tulare Co., Calif., bridges across St. Johns River near Visalia, California Div. of Highways, Sacramento, bids to Apr. 23.

130 Tons, Amador Co., Calif., powerhouse and related structures on Mokelumne River near Jackson, Pacific Gas & Electric Co., San Francisco, bids to Apr. 16 (from selected list of contractors).

125 Tons, Burlington, Iowa, warehouse for Benner Tea Co.

110 Tons, Prairie Du Schien, Wis., water reservoir previously reported. All bids rejected.

105 Tons, Humboldt Co., Calif., bridge across Klamath River at Weitchpec, California Div. of Highways, Sacramento, bids to Apr. 23.

• • • **Sheet piling inquiries** this week included the following:

525 Tons, Garrison, N. D., U. S. engineers, Missouri River project Garrison Dam.

• • • **Railroad car awards** this week included the following:

Canadian Pacific Ry. Co. has placed an order with American Locomotive Co., Schenectady, for 13 Diesel-electric switching locomotives.

• • • **Railroad car inquiries** this week included the following:

Canadian Car & Foundry Co., Montreal; C. P. R. Angus shops, Montreal, National Steel Car Co., Hamilton; and Eastern Car Co., New Glasgow, N. S., are sharing in Canadian Pacific Ry. Co.'s 1947 program involving purchase of 2500 steel sheathed 50-ton box cars, 325 overhead tank refrigerator cars, 250 hopper cars, 120 automobile cars and 50 cabooses. Contracts are being negotiated for 100 covered hopper cars and 26 mail baggage express cars. Chesapeake & Ohio Ry., Cleveland, is inquiring for bids on 3000 70-ton all steel hopper coal cars. Bids will be received Apr. 17.

Airco, Bethlehem And Koppers Study Oxygen

New York

• • • **About Sept. 1** of this year the large scale oxygen plant under construction at the Johnstown plant of Bethlehem Steel Co. is expected to come into operation to test the use of oxygen in blast furnaces and openhearths. In making this information public in its annual report, Air Reduction Co. discloses that Bethlehem Steel Co., Koppers Co. and Air Reduction are working on the low cost oxygen tests which, if successful, will be developed on a commercial sales basis by a corporation to be formed by one or more of the companies involved.

MACHINE TOOLS

. . . News and Market Activities

Improved Raw Materials Flow Brightens Machine Tool Picture

Cleveland

• • • **Despite** a varied spread of new firm orders, an atmosphere of cheerful optimism stemming from an improved flow of raw materials and higher productivity pervades the machine tool industry.

In Detroit, bookings of domestic business are off noticeably, according to most producers. While inquiries are still coming in, the amount of new business being placed is slackening. Foreign orders continue to be a bright spot in an otherwise rather dull market for machine tools. Several manufacturers of precision tools report a substantial amount of new business on hand. Generally speaking, however, most lines are spotty, including many production line items.

Construction of new facilities by Ford for the production of generators, starters, voltage regulators and ignition coils for Ford, Mercury and Lincoln cars and Ford tractors is scheduled to begin in April and full production is expected by the end of the year. The latest expansion will require considerable tooling and is expected to double the production capacity of the present plant at Ypsilanti.

In Cleveland, War Assets Administration has reported that approved machine tool dealers in the region sold more than $30,865,000 worth of surplus equipment in acquisitions costs during 1946 and have returned to the government $9,447,000 for a recovery of 31 pct.

This disposal record, which accounted for about one-fifth of all machine tools and related equipment sales made in northern Ohio and western Pennsylvania, was announced by regional officials as WAA celebrated its first anniversary Mar. 25.

Taking advantage of the 12½ pct commission granted by WAA under its approved dealer program, the position of dealers was seen as highly instrumental in funneling large quantities of production machinery into peacetime trade channels. They sold not only standard machine tools but also metal forming, woodworking and foundry equipment, conveyors, cranes, derricks and winches.

WAA Reports Cleveland Dealers Sold Over $30.8 Million In Surplus in 1946

° ° °

The list of approved sales organizations, which originally numbered more than 350, has been pared down to 126 dealers. There still remains in the Cleveland inventory more than $55 million worth of machine tools and related equipment that were purchased by the government for use in the production of war materials.

In Cincinnati the general trend in the market at present remains about the same as for the past several months. Builders report that new orders seem to be primarily foreign, while domestic buyers are holding back.

The Cincinnati Milling Machine Co. reported 1946 consolidated net income of $2,168,824 after taxes, equal to $2.32 per common share, were deducted.

Unfilled business at the year end was $15,500,000, compared to $17,200,000 at the end of 1945. After providing for capital expenditures of $1,245,602 and additional investments of $729,744, working capital at year end remained strong at $31,029,748. Extensive reconversion of plant, involving relocation of 13,400 tons of machinery and materials, was accomplished without interruption to production. There were 214 new machine tools installed to improve operations and lower costs.

Market engineering progress was reflected in regular shipments of eight new model machine tools and several additional new types undergoing production tests in customers' plants. Progress was also made in rebuilding sales outlets with eight new foreign agencies and shipments to 30 overseas countries. Despite the company's great wartime output, no comparable market surplus of its machine had developed in types needed for peacetime production.

Most builders are still doing a great deal of contracting work in order to hold their men and machines in operation.

In Boston, indications are that March shipments will average approximately 5 pct more than February and new bookings about 5 pct less, compared with March 1946 shipments, and new orders will average about 60 pct as large this March. Thus, the general trend of business among the rank and file is to the offside.

This condition is generally ascribed to the glut of government surplus equipment at attractive prices and to strikes as well as shortages of castings, steel, etc. On the assets side of company books are backlogs sufficient to carry on for 4 or 5 months, as well as fairly comfortable financial positions.

Scrapping Delayed

Washington

• • • The necessity for screening by the Army-Navy Munitions Board is holding up the scrapping of about 600,000 WAA machine tools. This was revealed at a recent meeting of representatives of various government agencies interested in the scrap situation. However, about 100,000 of these tools are so overage that they will soon be released by ANMB.

It was also stated at this meeting, called by Presidential Adviser John R. Steelman, that government agencies will put about 500,000 tons of openhearth and foundry scrap on the market within 45 days. The Navy is also considering making available supplies of scrap from the Pacific theater.

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NONFERROUS METALS

. . . News and Market Activities

Increase Magnesium Base, Extra Prices

New York

• • • **The Dow Chemical** Co. has announced base price and extra revisions on magnesium alloy extruded products effective Mar. 3 Base quantities on all extruded products have been increased to 30,000 lb or over from a former base of 5,000 to 10,000 lb. Prior to Nov. 12, 1946, the base quantity was 10,000 lb or over.

Now, unless otherwise specified, extruded magnesium alloys will be furnished with an oiled surface finish. The chrome pickled finish, formerly standard, is now subject to an extra charge.

Base prices per pound on extruded round rod, square and hexagonal bar for Dowmetal M range from 52¢ for ¾ in. to 4 in. diam and over, to 55¢ for ¼ in. up to ⅜ in. On the heavy shapes (above ¾ in.) constant differentials apply to the other alloys. For Dowmetal FS add 4¢ per lb; FS-1, add 7¢; J-1, add 15¢; O-1, add 17¢; O-1HTA, add 23¢. By way of comparison, the former prices of Dowmetal M extruded round rod were as follows: 4 in., 42.5¢; ¾ in., 44¢ ⅜ in., 46¢; ¼ in., 47¢. Extruded square and hexagonal bar: 4 in., 44.5¢; ¾ in., 46.5¢; ⅜ in., 48¢; ¼ in., 50¢.

Base prices on extruded solid shapes and rectangles in Dowmetal M range from 52¢ for form factors one to four, to 68¢ for form factors 26 to 28. The former prices were 47.5¢ for form factors one to four, 58.5¢ for factors 26 to 28.

A new method of pricing magnesium alloy extruded tubing is based on the weight in pounds per lineal foot of Dowmetal M. For Dowmetal M tubing, the new prices range from 55¢ per lb for tubing weighing 2 lb per ft and over, to $1.28 per lb for tubing weighing 0.04 to 0.044 lb per ft. The constant differentials for alloy tubing are no longer being used.

•

U. K. Lead, Copper Rise Won't Raise U. S. Price

New York

• • • **The British Ministry** of Supply has increased its prices for lead and copper to £90 and £237 a long ton, respectively. At the current rate of exchange these prices represent 16.19¢ per lb for lead and 24.65¢ per lb for copper.

Market observers anticipate that these increases will not immediately affect the domestic market, for they are in terms of blocked sterling which is not considered to be worth $4.

•

RFC to Buy Bolivia's 1947 Tin Ore Output

Washington

• • • **Under an agreement** concluded between the United States and Bolivia, the Reconstruction Finance Corp. will purchase substantially all the latter's 1947 production of tin ores and concentrates.

A basic price of 76¢ per lb of payable tin will be paid by the RFC for the output of Bolivian producers participating in the 1946 program, dating back to Jan. 1 but not including some 8000 long tons of fine tin held in storage for Argentina under the Bolivia-Argentina trade agreement.

The price agreed upon is 7¢ above the 1946 rate. It is estimated that the United States will receive from 10,000 to 12,000 long tons of contained tin this year from this source.

This represents less than half the total shipments from Bolivia last year when the United States imported 28,566 tons. No estimate was made of the total to be anticipated during 1947 since foreign stocks have been steadily declining.

•

Detinners Set Tin at 80¢

New York

• • • **Detinners have** followed the action announced by the British Ministry of Supply last week in raising Grade A tin to £437 per long ton, f.o.b. United Kingdom, by increasing their price for tin to 80¢ per lb f.o.b. plant effective Mar. 31. It is expected that contracts sent out by the Tin Sales Corp., received usually about the eighth of the month, will also price government tin at the same figure.

This is the action that had been anticipated following conclusion of the contract between Argentina and Bolivia for 8000 tons per year at a price of 76¢. The new British price at current exchange rates represents 78.52¢ which, when freight, insurance and brokerage charges are added, comes to slightly over 80¢ per lb.

Monthly Average Prices

• • • **The average prices of the major nonferrous metals in March, based on quotations appearing in** The Iron Age, **were as follows:**

	Cents Per Pound
Electrolytic copper, Conn. Valley	21.433
Lake copper, Conn. Valley	21.558
Straits tin, New York	70.00
Zinc, East St. Louis	10.50
Zinc, New York	11.005
Lead, St. Louis	14.762
Lead, New York	14.962

Nonferrous Metals Prices

Cents per pound

	Mar. 26	Mar. 27	Mar. 28	Mar. 29	Mar. 31	Apr. 1
Copper, electro, Conn.	21.50	21.50	21.50	21.50	21.50	21.50
Copper, Lake, Conn.	21.625	21.625	21.625	21.625	21.625	21.625
Tin, Straits, New York	70.00	70.00	70.00	....	70.00	70.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50	10.50	10.50
Lead, St. Louis	14.80	14.80	14.80	14.80	14.80	14.80

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point (min. 10,000 lb)	15.00
Aluminum pig, f.o.b. shipping point	14.00
Antimony, American Laredo Tex.	33.00
Beryllium copper, 3.75-4.25% Be; dollars per lb contained Be	$14.75
Beryllium aluminum, 5% Be; dollars per lb contained Be	$27.50
Cadmium, del'd	$1.75
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Copper, electro, Conn. Valley	21.50
Copper, lake, Conn. Valley	21.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$110.00
Lead, St. Louis	14.80
Lead, New York	15.00
Magnesium, 99.8+%	20.50
Magnesium, sticks, carlots	36.00
Mercury, dollars per 76-lb flask, f.o.b. New York	$86.50 to 88.00
Nickel, electro, f.o.b. New York	37.67
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$58 to $61
Silver, New York, cents per oz.	75.75
Tin, Straits, New York	70.00
Zinc, East St. Louis	10.50
Zinc, New York	11.005
Zirconium copper, 6 pct Zr, per lb contained Zr	$8.75

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot	
No. 115	21.50
No. 120	21.00
No. 123	20.50
80-10-10 ingot	
No. 305	24.50
No. 315	23.00
88-10-2 ingot	
No. 210	27.25
No. 215	26.25
No. 245	23.50
Yellow ingot	
No. 405	17.00
Manganese Bronze	
No. 421	19.25

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys:	
0.30 copper, max.	17.50—18.00
0.60 copper, max.	17.00—17.75
Piston alloys (No. 122 type)	15.50—16.50
No. 12 alum. (No. 2 grade)	14.75—15.75
108 alloy	15.00—16.00
195 alloy	15.75—16.50
AXS-679	15.25—16.00
Steel deoxidizing aluminum, notch-bar, granulated or shot	
Grade 1—95 pct-97½ pct	16.00—17.00
Grade 2—92 pct-95 pct	15.00—16.00
Grade 3—90 pct-92 pct	14.25—15.50
Grade 4—85 pct-90 pct	13.75—15.00

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	36¾
Electrodeposited	31⅝
Rolled, oval, straight, delivered	32⅛
Brass, 80-20, frt allowed	
Cast, oval, 15 in. or longer	33
Zinc, Cast, 99.99	18¾
Nickel, 99 pct plus, frt allowed	
Cast	51
Rolled, depolarized	52
Silver, 999 fine	
Rolled, 1000 oz lots, per oz.	88¼

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	40.50
Copper sulphate, 99.5, crystals, bbls	11.50
Nickel salts, single, 425 lb bbls, frt allowed	14.50
Silver cyanide, 100 oz. lots, per oz	70⅞
Sodium cyanide, 96 pct, domestic, 200 lb drums	15.00
Zinc cyanide, 100 lb drums	34.00
Zinc, sulphate, 89 pct, crystals, bbls, frt allowed	7.75

Mill Products

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall: 3S, 43.5¢; 52S-O, 67¢; 24S-T, 71¢; base, 30,000 lb.

Plate: ¼ in. and heavier; 2S, 3S, 21.2¢; 52S, 24.2¢ 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75S-AL, 30.5¢; base, 30,000 lb.

Flat Sheet: 0.136-in. thickness: 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 28¢; 63S, 27¢; 75S, 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 37.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢; 1 in., 2 in., 27¢; base, 5000 lb. *Rod:* 2S, 3S, 1¼ to 2½ in. diam, rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. *Round Wire:* drawn, coiled, B & S gage 17-18; 2S, 3S, 33.5¢; 56S, 39.5¢; 10,000 lb base. B & S gage 00-1: 2S, 3S, 21¢; 56S, 30.5¢. B & S 15-16; 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

Magnesium

(Cents per lb. f.o.b. mill. Base quantity 30,000 lb.)

Sheet and Plate: Ma. FSa. ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 14, 69¢-74¢; 16, 79¢-81¢; 18, 87¢-89¢; 22, $1.25-$1.31; 24, $1.71-$1.75.

Round Rod, Square and Hexagonal Bar: M, diam, in. ¼ to ⅜, 55¢; ⅜ to ¾, 52.5¢; ¾ to 4 in. and over, 52¢. Other alloys higher.

Extruded Solid Shapes and Rectangles: M, form factors 1 to 4, 52¢; 8 to 10, 53.5¢; 14 to 16, 56.5¢; 20 to 22, 61¢; 26 to 28, 68¢. Other alloys higher.

Tubing: M, based on weight in pounds per lineal foot, 2 lb. and over, 55¢; 1 to 1.5, 58.5¢; 0.5 to 0.7, 64¢; 0.35 to 0.4, 69¢; 0.25 to 0.3, 73¢; 0.15 to 0.2, 81¢; 0.085 to 0.10, 96¢; 0.05 to 0.06, $1.14; 0.04 to 0.045, $1.28. Other alloys higher.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets	..	41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks	..	31

Zinc

(Cents per lb, f.o.b. mill)

Sheet, l.c.l.	15.50
Ribbon, ton lots	14.50
Plates	
Small	13.50
Large, over 12 in.	14.50

Copper, Brass, Bronze

(Cents per lb)

	Extruded Shapes	Rods	Sheets
Copper	32.78	....	32.93
Copper, hot rolled	....	29.28	....
Copper, drawn	....	30.28	....
Low brass	39.13	30.32	30.63
High brass	37.38	28.57	28.88
Red brass	39.74	30.93	31.24
Naval brass	28.73	27.48	33.42
Brass, free cutting	27.23	23.64	....
Commercial bronze	40.86	32.05	32.36
Manganese bronze	32.28	30.78	36.92
Phosphor bronze, 5 pct.	....	51.00	50.75
Muntz metal	28.42	27.17	31.61
Everdur, Herculoy Olympic, etc.	36.30	36.65	37.71
Nickel silver, 5 pct.	40.54	39.53	37.92
Architectural bronze	27.23	....	....

Scrap Metals

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Brass Mill Scrap

(Lots of less than 15,000 lb.)

Cartridge brass turnings	14¼
Loose yellow brass trimmings	15⅛

Copper and Brass

No. 1 heavy copper and wire	16½—17
No. 2 heavy copper and wire	15½—16
Light copper	14½—15
Auto radiators (unsweated)	10¾—11¼
No. 1 composition	14¼—15
No. 1 composition turnings	13¼—14
Clean red car boxes	12 —12½
Cocks and faucets	11¼—11¾
Mixed heavy yellow brass	9¾—10¼
Old rolled brass	9½—10
Brass pipe	11½—11¾
New soft brass clippings	13 —13½
Brass rod ends	12½—12¾
No. 1 brass rod turnings	12 —12½

Aluminum

Alum. pistons with struts	4½—5
Aluminum crankcases	6¾—7
2S aluminum clippings	8¼—8½
Old sheet & utensils	6¾—7
Mixed borings and turnings	2½—3
Misc. cast aluminum	6¼—6¾
Dural clips (24S)	5¾—6

Zinc

New zinc clippings	7 — 7½
Old zinc	5¼— 5¾
Zinc routings	3 — 3⅛
Old die cast scrap	3 — 3¼

Nickel and Monel

Pure nickel clippings	22 —23
Clean nickel turnings	17 —18
Nickel anodes	19½—20½
Nickel rod ends	20 —21
New Monel clippings	14 —15
Clean Monel turnings	9 —10
Old sheet Monel	12 —12½
Old Monel castings	10 —11
Inconel clippings	10 —11
German silver clippings, mixed	10½—11
German silver turnings, mixed	7 — 7¼

Lead

Soft scrap lead	12 —12½
Battery plates (dry)	7 — 7½

Miscellaneous

Block tin	60
No. 1 pewter	46 —48
No. 1 auto babbitt	35 —36
Mixed common babbitt	12 —12¼
Solder joints	13¼—13⅝
Siphon tops	38 —39
Small foundry type	15 —15½
Monotype	13½—14
Lino and stereotype	12 —13
Electrotype	11 —12
New type shell cuttings (nom)	13 —13½
Clean hand picked type shells	5½— 6
Lino and stereo dross	6 — 6¼
Electro dross	4 — 4½

Lead Products

(Cents per lb)

F.o.b. shipping point freight collect. Freight equalized with nearest free delivery point.

Full lead sheets	18.25
Cut lead sheets	18.75
Lead pipe, manufacturing point	17.50
Lead traps and bends	List +42%
Combination lead and iron bends and ferrules, also combination lead and iron ferrules	List +42%
Lead wool	19.50

SCRAP

. . . News and Market Activities

Mill Resistance Forces Sharp Price Break

New York

• • • **Strong consumer resistance** forced scrap prices down sharply this week. Backed by the best scrap inventories in many months, a number of mills stepped out of the market. Others quietly placed some new business at prices $2 and more below last week's quotations.

Average declines in No. 1 ranged from $3.25 in the Valley and $2.75 in Philadelphia, through $2.50 in Boston and $2.88 in New York to $2 in Pittsburgh and Cincinnati. Birmingham was down $3, Chicago $1.50. The lighter end of the steelmaking and blast furnace list also dropped proportionally but very little weakness appeared in cast iron.

The ability, first noted last week, of mills to pull out of the market, was seen as primarily responsible for the additional price weakness this week. Excellent shipments have allowed most steel mills to lay down a small stockpile, giving them a stick with which to back up their price resistance. But the scrap trade knows it isn't a big stick, and at current operating rates it is likely to shrink quickly.

This slightly better mill inventory position has tended to put a halt to a practice which mill purchasing agents have privately admitted was not to the best interests of steel companies. Cross hauling of earmarked scrap continues but the willingness to buy almost anything anywhere at any price—even though it meant raiding a competitor's normal buying area—had virtually disappeared in most districts.

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PITTSBURGH—Steel mills are finding it harder to pull the local prices of scrap down than it was to push them up. The major consumers here are out of the market, supposedly because their stocks are heavy. Actually, stocks are better, but there is a concerted effort to break the present high prices, and, to date, that effort locally has amounted to more wishful thinking than it has to actual price reduction. Out-of-district scrap is coming in at lower prices, but the local price early in the week held firmly at $38. Turnings, despite the fact that there were no new purchases this week, dropped sharply by reason of a drop in the Eastern market that would not sustain local prices. One broker indicated he would attempt to buy unprepared at a price that after preparation he would be able to dispose of for $35 a ton. His success in getting such material is not known, but may set a pattern for a price decrease.

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CHICAGO—All steel companies were quiet last week on new business. Recent shipments have been heavy and mills indicate they are in no hurry to go back into the market. Most consumers will only cancel existing $36 tonnages on suppliers who did not honor their low price contracts when prices were rising rapidly. Mills here are generally covered through April at the high price and may not be forced to place new orders for a week or so. Consumer interest in scrap from distant points has ceased.

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PHILADELPHIA—Mills are continuing to withhold orders for scrap, and the heavy melting market is off based on transactions by brokers and dealers by $2.50 to $3.50 a ton. This brings these grades to $37 to $37.50 delivered. Other grades except cast are down by lesser amounts. While mills remain out of the market, it is the opinion of the trade that the market will continue to be depressed. Although large tonnages came into the mills recently, observers consider that they must come back into the market soon.

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NEW YORK—Except for wrapping up loose ends many brokers here did little new business last week and early this week several were still out of the market awaiting developments. However, two or three were buying early this week, paying $34.25 for heavy melting steel, down $2.25 from last week's average. There was some powerful wishful thinking on lower quotations, but as long as some brokers were paying $34.25 for lots up to 1000 tons it remained a mere bearish hope. No price break has appeared in cast.

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DETROIT—While there is scattered evidence that the market here has broken at least $2 and that scrap is in more plentiful supply than at any time in months, large mill buyers in this area are not at present in the market and prices are therefore being held at previous levels until substantial tonnages move at the new and lower levels. According to most sources, pressure from out-of-town buyers has all but vanished for the moment and there is evidence that both local mills and local foundries are now comfortable so far as scrap is concerned. As some observers see it the indications are that at least another week may elapse before local mills are back in the Detroit market.

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CLEVELAND—Valley prices, with low phos leading the way, showed signs of a gradual tapering off this week and consumers were timing their resistance accordingly. Really fancy prices for material from other districts are practically a thing of the past, and some major consumers, with enough No. 1 on the ground or on the books at $38, are refusing offerings at that figure. Some material is still moving at higher prices, and scrap generally is moving freely. Most dealers still have more orders than scrap, which should be a conditioning factor in mills' resistance, or as a local wag put it, "You can't melt low prices."

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BOSTON—Market for new business is not established, steel mills not having stated their position on prices. Brokers are completing old orders at $34 a ton for heavy steel, generally $29 for shoveling turnings, $25 for machine shop turnings, and $28 for chemical borings, these prices good until April 5. Mills are expected to re-enter the market after that date. Cast is selling at peak March prices.

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BIRMINGHAM—The first major break since prices began to spiral occurred here this week with heavy melting grades dropping $3 a ton. The district's largest consumer was making only limited purchases at that figure, however, in the belief a further price decline was probable. Movement of most material on prior commitments is heavy.

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ST. LOUIS—One of the two largest steel mills in the district came into the market Monday with a fixed tonnage for April delivery at March prices, placed with seven or eight brokers. The other large mill has delayed its commitments for a few days. Thus the market is confused and for the present the prices quoted as of last week are unchanged. Brokers opine that prices will drop about $3.50 a ton later this week. Receipts the last week have increased as country dealers want to beat rumored lower prices.

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BUFFALO—One of the district's major consumers notified dealers that contracts not fulfilled by April 3 were killed under their cancellation clauses. The $41 and $43 prices offered by this mill ended at that time, and new contracts were offered at $35 and $37. Thus the prices quoted at the right were in effect on press date, Apr. 1, though lower figures are probable for later this week. The trade thinks a $35 market will result.

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CINCINNATI—In line with the experience in other districts, the market in this area is definitely soft, and prices have tumbled $2 on practically all items. Dealers and brokers indicate that even at a lower price, sales are not as brisk as heretofore, since most consumers are apparently fairly well supplied at this time.

PITTSBURGH

Per gross ton delivered to consumer:†

No. 1 hvy. melting	$38.00 to $40.00
RR. hvy. melting	37.50 to 38.00
No. 2 hvy. melting	38.00 to 40.00
RR. scrap rails	41.00 to 42.00
Rails 2 ft. and under	45.00 to 46.00
No. 1 comp'd bundles	38.00 to 40.00
Hand bdld. new shts	38.00 to 40.00
Hvy. axle turn	37.00 to 37.50
Hvy. steel forge turn	37.00 to 37.50
Mach. shop turn	30.00 to 31.00
Short. shov. turn	31.00 to 32.00
Mixed bor. and turn	30.00 to 31.00
Cast iron borings	30.00 to 31.00
No. 1 cupola cast	44.00 to 46.00
Heavy breakable cast	**38.00 to 39.00**
Malleable	**44.00 to 45.00**
RR. knuck. and coup.	47.00 to 48.00
RR. coil springs	47.00 to 48.00
Rail leaf springs	47.00 to 48.00
Rolled steel wheels	47.00 to 48.00
Low phos.	44.00 to 45.00

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$35.50 to $36.00
No. 2 hvy. melting	35.50 to 36.00
No. 1 bundles	35.50 to 36.00
No. 2 dealers' bundles	35.50 to 36.00
Bundled mach. shop turn.	35.50 to 36.00
Galv. bundles	**33.50 to 34.00**
Mach. shop turn	**30.50 to 31.00**
Short shov. turn	**32.50 to 33.00**
Cast iron borings	**31.50 to 32.00**
Mix. borings & turn	**30.50 to 31.00**
Los. phos. hvy. forge	**40.00 to 41.50**
Low phos. plates	38.00 to 38.50
No. 1 RR. hvy. melt	36.50 to 37.00
Rerolling rails	42.00 to 42.50
Miscellaneous rails	**43.00 to 44.00**
Angles & splice bars	45.00 to 47.75
Locomotive tires, cut	42.00 to 45.00
Cut bolster & side frames	**39.00 to 40.00**
Standard stl. car axles	**43.00 to 44.00**
No. 3 steel wheels	41.00 to 43.00
Couplers & knuckles	**43.50 to 45.00**
Malleable	**48.00 to 49.00**
No. 1 mach. cast	**46.00 to 47.00**
Rails 2 ft. and under	**49.00 to 50.00**
No. 1 agricul. cast	**38.50 to 39.00**
Hvy. breakable cast	**37.50 to 38.00**
RR. grate bars	40.50 to 41.00
Cast iron brake shoes	**40.00 to 42.00**
Stove plate	**41.00 to 42.00**
Cast iron carwheels	39.00 to 40.00

CINCINNATI

Per gross ton delivered to consumer:†

No. 1 hvy. melting	$34.00 to $36.00
No. 2 hvy. melting	34.00 to 36.00
No 1 bundles	34.00 to 36.00
No. 2 bundles	34.00 to 36.00
Mach. shop turn	29.00 to 31.00
Shoveling turn.	29.00 to 30.00
Cast iron borings	27.00 to 29.00
Mixed bor. & turn	27.00 to 29.00
Low phos. plate	38.00 to 40.00
No. 1 cupola cast	47.00 to 49.00
Hvy. breakable cast	34.00 to 35.00
Scrap rails	38.00 to 39.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	33.00 to 34.00
Nos. 1 and 2 bundles	33.00 to 34.00
Busheling	33.00 to 34.00
Turnings, shovelings	28.00 to 29.00
Machine shop turn	25.00
Mixed bor. & turn	25.00
Cl'n cast. chem. bor	27.00 to 28.00
No. 1 machinery cast	**40.00 to 45.00**
No. 2 machinery cast	**40.00 to 45.00**
Heavy breakable cast	**40.00 to 45.00**
Stove plate	**40.00 to 45.00**

DETROIT

Per gross, ton, brokers' buying prices, f.o.b. cars:

No. 1 hvy. melting	$34.75 to $35.25
No. 2 hvy. melting	34.75 to 35.25
No. 1 bundles	34.75 to 35.25
New busheling	34.75 to 35.25
Flashings	34.75 to 35.25
Mach. shop turn	28.00 to 28.50
Short shov. turn	28.00 to 28.50
Cast iron borings	28.00 to 28.50
Mixed bor. & turn	28.00 to 28.50
Low phos. plate	36.75 to 37.25
No. 1 cupola cast	41.25 to 45.25
Hvy. breakable cast	37.25 to 39.25
Stove plate	37.25 to 39.25
Automotive cast	48.50 to 50.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$37.00 to $37.50
No. 2 hvy. melting	37.00 to 37.50
No. 1 bundles	37.00 to 37.50
No. 2 bundles	37.00 to 37.50
Mach. shop turn.	26.50 to 27.50
Shoveling turn.	27.50 to 28.50
Mixed bor. & turn.	26.50 to 27.50
Clean cast chemical bor.	34.00 to 35.00
No. 1 cupola cast	**49.00 to 51.00**
Hvy. breakable cast	46.00 to 47.00
Cast. charging box	46.00 to 47.00
Clean auto cast	**49.00 to 51.00**
Hvy. axle forge turn	37.00 to 37.50
Low phos. plate	41.50 to 42.50
Low phos. punchings	41.50 to 42.50
Low phos. bundles	40.00 to 41.00
RR. steel wheels	43.50 to 44.50
RR. coil springs	43.50 to 44.50
RR. malleable	**49.00 to 51.00**

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages. Where substantial tonnages of open hearth grades come into a consuming district from outside of that district, the upper range of the price quoted here is the representative average delivered price of the bulk of this incoming material; the lower range shows the price being paid for scrap originating within the consuming district.

ST. LOUIS

Per gross ton delivered to consumer:†

No. 1 hvy. melting	$35.50 to $36.50
Bundled sheets	35.50 to 36.50
Mach. shop turn	30.00 to 31.00
Locomotive tires, uncut	37.00 to 38.00
Mis. std. sec. rails	40.00 to 42.00
Rerolling rails	42.00 to 44.00
Steel angle bars	40.00 to 41.00
Rails 3 ft. and under	42.00 to 44.00
RR. steel springs	40.00 to 41.00
Steel car axles	38.00 to 40.00
Stove plate	36.00 to 38.00
Grate bars	35.00 to 36.00
Brake shoes	35.00 to 36.00
Malleable	48.00 to 50.00
Cast iron car wheels	40.00 to 41.00
No. 1 machinery cast	40.00 to 41.00
Breakable cast	37.00 to 38.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$33.00
No. 2 hvy. melting	33.00
No. 2 bundles	33.00
No. 1 busheling	33.00
Long turnings	23.00
Shoveling turnings	25.00
Cast iron borings	24.00
Bar crops and plate	$36.00 to 37.00
Structural and plate	**38.00 to 38.50**
No. 1 cast	**37.50 to 42.50**
Stove plate	**37.00 to 40.00**
Steel axles	**36.00 to 37.00**
Scrap rails	35.00 to 36.00
Rerolling rails	**39.00 to 40.00**
Angles & spice bars	37.00 to 38.00
Rails 3 ft. & under	37.00 to 38.00
Cast iron carwheels	**32.00 to 32.50**

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$37.50 to $38.00
No. 2 hvy. melting	37.50 to 38.00
Low phos. plate	41.50 to 42.00
Mach. shop turn	29.50 to 30.00
Short shov. turn	31.50 to 32.00
Cast iron borings	31.50 to 32.00
Elec. furnace punch	41.50 to 42.00

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$33.00 to $34.25
No. 2 hvy. melting	**33.00 to 34.25**
Comp. black bundles	33.00 to 34.25
Comp. galv. bundles	$31.75 to 32.25
Mach. shop turn.	23.75
Mixed bor. & turn.	23.75
Shoveling turn.	24.75
No. 1 cupola cast	42.00 to 43.00
Hvy. breakable cast	40.75 to 41.00
Charging box cast	$41.00 to $43.00
Stove plate	41.00 to 43.00
Clean auto cast	41.00 to 43.00
Unstrip. motor blks	39.00 to 41.00
Cl'n chem. cast bor	29.00

†See box above.

BUFFALO

Per gross ton delivered to consumer:†

No. 1 hvy. melting	$37.50 to $41.00
No. 2 hvy. melting	37.50 to 41.00
No. 1 bundles	37.50 to 41.00
No. 2 bundles	37.50 to 41.00
Mach. shop turn.	29.00 to 30.00
Shoveling turn.	31.00 to 32.00
Cast iron borings	29.00 to 30.00
Mixed bor. & turn.	29.00 to 30.00
No. 1 cupola cast	40.00 to 45.00
Charging box cast	29.00 to 30.00
Stove plate	**30.00 to 35.00**
Clean auto cast	**35.00 to 40.00**
Malleable	**45.00 to 47.00**
Low phos. plate	40.00 to 43.00
Scrap rails	32.00 to 35.00
Rails 3 ft. & under	40.00 to 43.00
RR. steel wheels	40.00 to 43.00
Cast iron carwheels	40.00 to 43.00
RR. coil & leaf spgs.	40.00 to 43.00
RR. knuckles & coup.	38.00 to 40.00
No. 1 busheling	37.50 to 41.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$37.00 to $37.50
No. 2 hvy. melting	37.00 to 37.50
Compressed sheet stl.	37.00 to 37.50
Drop forge flashings	37.00 to 37.50
No. 2 bundles	37.00 to 37.50
Mach. shop turn	29.00 to 29.50
Short shovel.	31.00 to 31.50
No. 1 busheling	37.00 to 37.50
Steel axle turn.	37.00 to 37.50
Cast iron borings	31.00 to 31.50
Mixed bor. & turn.	31.00 to 31.50
No. 1 machinery cast	45.00 to 46.00
Malleable	45.00 to 46.00
Railroad cast	45.00 to 46.00
Railroad grate bars	40.00 to 42.00
Stove plate	40.00 to 43.00
RR. hvy. melting	37.00 to 37.50
Rails 3 ft. & under	48.00 to 49.00
Rails 18 in. & under	48.00 to 49.00
Elec. furnace punch	41.00 to 41.50

SAN FRANCISCO

Per gross ton delivered to consumer:

No. 1 hvy. melting	**$19.50**
No. 2 hvy. melting	**19.50**
No. 2 bales	**19.50**
No. 3 bales	**16.00**
Mach. shop turn.	**13.00**
Elec. furn. 1 ft. und.	**25.00**
No. 1 cupola cast	**$32.00 to 33.00**
RR. hvy. melting	**20.50**

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	**$19.50**
No. 2 hvy. melting	**19.50**
No. 1 bales	**19.50**
No. 2 bales	**19.50**
No. 3 bales	**16.00**
Mach. shop turn.	**14.50**
No. 1 cupola cast	**$35.00 to 36.00**
RR. hvy. melting	**20.50**

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melting	**$20.00**
Elec. furn. 1 ft. und.	24.00
No. 1 cupola cast	**29.00**
RR. hvy. melting	**21.00**

HAMILTON, ONT.

Per gross ton delivered to consumer:

Cast grades f.o.b. shipping point

Heavy melting	**$17.50•**
No. 1 bundles	**17.50•**
No. 2 bundles	**17.00•**
Mixed steel scrap	**15.50•**
Rails, remelting	**18.50•**
Rails, rerolling	**21.50•**
Bushelings	**13.00•**
Mixed borings & turnings	**12.50•**
Electric furnace bundles	**20.50•**
Manganese steel scrap	**20.00•**
No. 1 cast	**19.00•**
Stove plate	**17.50•**
Car wheels, cast	**19.50•**
Malleable iron	**16.00•**

• Ceiling price

Comparison of Prices . .

Advances over past week in **Heavy Type**, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	Apr. 1, 1947	Mar. 25, 1947	Mar. 4, 1947	Apr. 2, 1946
Hot-rolled sheets	2.50	2.50	2.50	2.425
Cold-rolled sheets	3.20	3.20	3.20	3.275
Galvanized sheets (10 ga.)	3.55	3.55	3.55	4.05*
Hot-rolled strip	2.50	2.50	2.50	2.35
Cold-rolled strip	3.20	3.20	3.20	3.05
Plates	2.65	2.65	2.65	2.50
Plates, wrought iron	5.95	5.95	5.95	4.112
Stain's c-r strip (No. 302)	30.30	30.30	30.30	28.00
*24 ga				
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes.	$5.75	$5.75	$5.75	$5.00
Tinplate, electro (0.50 lb)	5.05	5.05	5.05	4.50
Special coated mfg. ternes	4.90	4.90	4.90	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.60	2.60	2.60	2.50
Cold-finished bars	3.20	3.20	3.20	3.10
Alloy bars	3.05	3.05	3.05	2.92
Structural shapes	2.50	2.50	2.50	2.35
Stainless bars (No. 302)	26.00	26.00	26.00	24.00
Wrought iron bars	6.15	6.15	6.15	4.76
Wire and Wire Products: (cents per pound)				
Bright wire	3.30	3.30	3.30	3.05
Wire nails	3.75	3.75	3.75	3.25
Rails: (dollars per 100 lb)				
Heavy rails	$2.50	$2.50	$2.50	$43.39*
Light rails	2.85	2.85	2.85	49.18*
*per net ton				
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$42.00	$42.00	$42.00	$39.00
Sheet bars	50.00	50.00	50.00	38.00
Slabs, rerolling	42.00	42.00	42.00	39.00
Forging billets	50.00	50.00	50.00	47.00
Alloy blooms, billets, slabs	61.00	61.00	61.00	58.43
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.55	2.55	2.55	2.30
Skelp	2.35	2.35	2.35	2.05

Pig Iron: (per gross ton)	Apr. 1, 1947	Mar. 25, 1947	Mar. 4, 1947	Apr. 2, 1946
No. 2, foundry, Phila.	$36.51	$36.51	$36.51	$28.34
No. 2, Valley furnace	33.50	33.50	33.50	26.50
No. 2, Southern, Cin'ti	34.75	34.75	31.75	26.94
No. 2, Birmingham	29.88	29.88	26.88	22.88
No. 2, foundry, Chicago†	33.00	33.00	33.00	26.50
Basic, del'd eastern Pa.	36.92	36.92	37.67	27.84
Basic, Valley furnace	33.00	33.00	33.00	26.00
Malleable, Chicago†	33.50	33.50	33.50	26.50
Malleable, Valley	33.50	33.50	33.50	26.50
Charcoal, Chicago	45.99	45.99	42.99	42.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	*$39.00*	$41.00	$37.88	$20.00
Heavy melt'g steel, Phila.	*37.25*	40.25	37.00	18.75
Heavy melt'g steel, Ch'go	*35.75*	37.25	35.00	18.75
No. 1, hy. comp. sheet, Det.	35.00	35.00	35.00	17.32
Low phos. plate, Youngs'n	*41.75*	44.25	41.75	22.50
No. 1, cast, Pittsburgh	45.00	44.50	42.50	20.00
No. 1, cast, Philadelphia	50.00	50.00	46.00	20.00
No. 1, cast, Chicago	46.50	46.50	44.25	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$9.00	$9.00	$9.00	$7.50
Foundry coke, prompt	10.25	10.25	10.25	9.00
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	21.50	21.50	21.50	12.00
Copper, Lake, Conn.	21.625	21.625	21.625	12.00
Tin, Straits. New York	70.00	70.00	70.00	52.00
Zinc, East St. Louis	10.50	10.50	10.50	8.25
Lead, St. Louis	14.80	14.80	14.80	6.35
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	37.67	37.67	37.67	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	33.00	33.00	28.25	14.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Apr. 1, 1947	2.86354¢ per lb.	$33.15 per gross ton	*$37.33* per gross ton
One week ago	2.86354¢ per lb.	$33.15 per gross ton	$39.50 per gross ton
One month ago	2.86354¢ per lb.	$32.23 per gross ton	$36.67 per gross ton
One year ago	2.73011¢ per lb.	$26.12 per gross ton	$19.17 per gross ton

	HIGH	LOW
1947	2.86354¢	2.86354¢
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5
1943	2.29176¢	2.29176¢
1942	2.28249¢	2.28249¢
1941	2.43078¢	2.43078¢
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16
1939	2.35367¢ Jan. 3	2.26689¢ May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2
1933	1.95578¢ Oct. 3	1.75836¢ May 2
1932	1.99196¢ July 5	1.83901¢ Mar. 1
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941, issue.

HIGH	LOW
$33.15 Mar. 11	$30.14 Jan. 7
30.14 Dec. 10	25.37 Jan. 1
25.37 Oct. 23	23.61 Jan. 2
$23.61	$23.61
23.61	23.61
23.61	23.61
$23.61 Mar. 20	$23.45 Jan. 2
23.45 Dec. 23	22.61 Jan. 2
22.61 Sept. 19	20.61 Sept. 12
23.25 June 21	19.61 July 6
23.25 Mar. 9	20.25 Feb. 16
19.74 Nov. 24	18.73 Aug. 11
18.84 Nov. 5	17.83 May 14
17.90 May 1	16.90 Jan. 27
16.90 Dec. 5	13.56 Jan. 3
14.81 Jan. 5	13.56 Dec. 6
15.90 Jan. 6	14.79 Dec. 15
18.21 Jan. 7	15.90 Dec. 16
18.71 May 14	18.21 Dec. 17

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

HIGH	LOW
$39.67 Mar. 18	$31.00 Jan. 7
31.17 Dec. 24	19.17 Jan. 1
19.17 Jan. 2	18.92 May 22
19.17 Jan. 11	15.76 Oct. 24
$19.17	$19.17
19.17	19.17
$22.00 Jan. 7	$19.17 Apr. 10
21.83 Dec. 30	16.04 Apr. 9
22.50 Oct. 3	14.08 May 16
15.00 Nov. 22	11.00 June 7
21.92 Mar. 30	12.67 June 9
17.75 Dec. 21	12.67 June 8
13.42 Dec. 10	10.33 Apr. 29
13.00 Mar. 13	9.50 Sept. 25
12.25 Aug. 8	6.75 Jan. 3
8.50 Jan. 12	6.43 July 5
11.33 Jan. 6	8.50 Dec. 29
15.00 Feb. 18	11.25 Dec. 9
17.58 Jan. 29	14.08 Dec. 8

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

KAYDON BEARINGS OK'd

for New EMSCO Triplex Pumps

KAYDON Radial Roller Bearings, 14.000" x 18.000" x 2.500" are used in the gear reduction unit of the new Model A-10 EMSCO Triplex Pump, a powerful slush pump made by Emsco Derrick & Equipment Co., Los Angeles, California; Houston and Dallas, Texas.

Oil field operators know EMSCO Slush Pumps for their fine engineering design, that results in big savings in weight, higher horsepower capacity per unit of weight, greater strength, and dependable performance.

KAYDON Bearings, precision-built and rugged, fit right into the sound engineering policies that have made modern EMSCO machinery so successful.

Similarly, in other fields of heavy-duty machinery, **KAYDON** Bearings are helping designers add outstanding advantages. Huge precision grinders, steel mill equipment, paper mill machinery, road-building units, excavators, hoists, crushers, bending machines and other heavy-duty equipment are serving industry better because of **KAYDON** Bearings.

* * *

Capacity now available for all types and sizes of **KAYDON** Bearings . . . standard or special. A confidential discussion of your problems may point the way to opportunities through use of **KAYDON** Bearings.

KAYDON *Types of Standard or Special Bearings:*
Spherical Roller • Taper Roller • Ball Radial
Ball Thrust • Roller Radial • Roller Thrust

THE KAYDON ENGINEERING CORP., MUSKEGON, MICH.

All types of Ball and Roller Bearings 4" bore to 120" outside diameter

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 25c above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. (8) Also shafting. For quantities of 20,000 lb to 39,999 lb. (9) Carload lot in manufacturing trade. (10) This base price for annealed, bright finish wire, commercial spring wire. (11) Boxed. (12) Produced to dimensional tolerances in AISI Manual Sec. 6. (13) Delivered San Francisco only; Includes 3 pct freight tax. (14) Delivered Kaiser Co. prices; includes 3 pct freight tax. (15) 0.035 to 0.075 in. thick by ¾ to 3⅛ in. wide. (16) Some producers are charging 2.75c.

Basing Points	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio		San Franc'co, Los Angeles, Seattle	DELIVERED TO Detroit	New York	Philadelphia
INGOTS															
Carbon, rerolling	($35.00 f. o. b. mill)														
Carbon, forging	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00								
Alloy	$52.00						Canton=$52.00)								
BILLETS, BLOOMS, SLABS							(Provo=$53.20)								
Carbon, rerolling	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00					$45.00		
Carbon, forging billets	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	(Provo=$61.20, Duluth=$52.00[13]) $50.00						$53.00		
Alloy	$61.00	$61.00				$61.00	(Bethlehem, Massillon, Canton=$61.00)						$64.00		
SHEET BARS							$53.00		Portsmouth, Ohio=$67.20						
PIPE SKELP	2.35¢	2.35¢					2.35¢	2.35¢	(Coatesville=2.35¢)						
WIRE RODS	2.55¢	2.55¢		2.55¢	2.55¢	(Worcester=2.65¢)						3.27¢[13]			
SHEETS															
Hot-rolled	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.875¢	2.50¢			2.65¢	2.79¢	2.70¢
Cold-rolled [1]	3.20¢	3.20¢	3.20¢	3.20¢		3.20¢	3.20¢		3.30¢				3.35¢	3.61¢	3.58¢
Galvanized (10 gage)	3.55¢	3.55¢	3.55¢		3.55¢		3.55¢	3.55¢	3.65¢					3.84¢	3.75¢
Enameling (12 gage)	3.55¢	3.55¢	3.55¢	3.55¢			3.55¢		3.65¢				3.70¢	3.95¢	3.93¢
Long ternes [2] (10 gage)	3.55¢	3.55¢	3.55¢											3.95¢	3.91¢
STRIP															
Hot-rolled [3]	2.50¢	2.50¢	2.50¢	2.50¢[15]	2.50¢		2.50¢						2.65¢	2.93¢	2.88¢
Cold-rolled [4]	3.20¢	3.30¢		3.20¢			3.20¢			(Worcester=3.40¢)			3.35¢	3.61¢	3.58¢
Cooperage stock	2.80¢	2.80¢			2.80¢		2.80¢							3.09¢	
TINPLATE															
Standard cokes, base box	$5.75	$5.75	$5.75		$5.85			$5.85	$5.85		(Warren, Ohio=$5.75)			$6.157	$6.062[11]
Electro, box { 0.25 lb.	Deduct 90¢ from standard coke base box price.														
0.50 lb.	Deduct 70¢ from standard coke base box price.														
0.75 lb.	Deduct 50¢ from standard coke base box price.														
BLACKPLATE 29 gage [5]	3.60¢	3.60¢	3.60¢		3.70¢			3.70¢	3.70¢		(Warren, Ohio=$5.75)			3.99¢	3.90¢
TERNES, MFG. Special coated, base box	Deduct 85¢ from standard coke base box price.														
BARS															
Carbon steel [6]	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢					3.285¢	2.75¢	3.01¢	2.98¢
Rail steel [6, 16]	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢									
Reinforcing (billet) [7]	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢				2.985¢		2.74¢	2.65¢
Reinforcing (rail) [7, 16]	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢								
Cold-finished [8]	3.20¢	3.20¢	3.20¢	3.20¢		3.20¢	(Detroit=3.25¢)							3.61¢	3.58¢
Alloy, hot-rolled	3.05¢	3.05¢				3.05¢	3.05¢	(Bethlehem, Massillon, Canton=3.05¢)					3.20¢		3.19¢
Alloy, cold-drawn	3.80¢	3.80¢	3.80¢	3.80¢		3.80¢							3.95¢		
PLATE								(Coatesville, Claymont=2.80¢, Geneva, Utah=2.80¢)							
Carbon steel [12]	2.65¢	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢	2.65¢				3.46¢[14]		2.87¢	2.85¢
Floor plates	3.90¢	3.90¢												4.30¢	4.28¢
Alloy	3.79¢	3.79¢			(Coatesville=4.10¢)									4.01¢	3.895¢
SHAPES							(Geneva, Utah=2.65¢)								
Structural	2.50¢	2.50¢	2.50¢		2.50¢	2.50¢	(Bethlehem=2.50¢)					3.41¢[14]		2.70¢	2.64¢
SPRING STEEL, C-R															
0.26 to 0.40 carbon	3.20¢			3.20¢			(Worcester=3.40¢)								
0.41 to 0.60 carbon	4.70¢			4.70¢			(Worcester=4.90¢)								
0.61 to 0.80 carbon	5.30¢			5.30¢			(Worcester=5.50¢)								
0.81 to 1.00 carbon	6.80¢			6.80¢			(Worcester=7.00¢)								
Over 1.00 carbon	9.10¢			9.10¢			(Worcester=9.30¢)								
MANUFACTURERS' WIRE [9]															
Bright [10]	3.30¢	3.30¢		3.30¢	3.30¢		(Worcester=3.40¢, Duluth=3.35¢)					5.63¢[13]		3.71¢	3.68¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	4.25¢	4.25¢		4.25¢		(Worcester=4.35¢, Duluth=4.50¢)				(Trenton=4.50¢)		5.24¢[13]		4.66¢	4.345¢
PILING															
Steel sheet	3.00¢	3.00¢				3.00¢								3.41¢	3.36¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

Basing Point	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	22.99	24.67	17.01	17.47	20.69	25.29
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	22.99	24.67	17.01	17.47	20.69	25.29
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt.	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville	23.00	22.50	17.50	17.50	21.00	25.50
ars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	27.50	26.00	20.50	21.00	24.50	30.00
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	27.50	26.00	20.50	21.00	24.50	30.00
Plates, P'gh, Middletown, Canton	31.50	29.50	23.50	24.00	28.00	33.00
Shapes, structural, P'gh, Chi	27.50	26.00	20.50	21.00	24.50	30.00
Sheets, P'gh, Chi, Middletown, Canton, Balt.	39.00	37.00	29.00	31.50	35.50	39.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.50	23.50	18.50	19.00	26.00	38.00
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	32.50	30.50	24.00	24.50	35.00	56.50
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J. Phila., Ft. Wayne	27.50	26.00	20.50	21.00	24.50	30.00
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	32.48	30.30	23.80	24.34	34.62	56.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	29.75
Tubing, seamless, P'gh, Chi, Canton, (4 to 6 in.)	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, Ohio)*

W	Cr	V	Mo		Base per Pounds
18	4	1	—	.....	74¢
1.5	4	1.5	8	.....	59¢
6	4	2	6	.....	63¢

High-carbon-chromium* ..... 47¢
Oil hardening manganese* ..... 26¢
Special carbon* ..... 24¢
Extra carbon* ..... 20¢
Regular carbon* ..... 16¢

Warehouse prices on and east of Mississippi are 2¢ per lb. higher; west of Mississippi, 4¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	Per lb
Field grade	4.20¢
Armature	4.50¢
Electrical	5.00¢
Motor	5.70¢
Dynamo	6.45¢
Transformer 72	6.95¢
Transformer 65	7.65¢
Transformer 58	8.35¢
Transformer 52	9.15¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., per 100 lb	$2.50
Angle splice bars, 100 lb	3.00
(F.o.b. basing points)	*per 100 lb*
Light rails (from billets)	$2.85
Light rails (from rail steel), f.o.b. Williamsport, Pa.	2.95

	Base per lb
Cut spikes	4.50¢
Screw spikes	6.40¢
Tie plate, steel	2.80¢
Tie plates, Pacific Coast	2.95¢
Track bolts	6.50¢
Track bolts, heat treated, to rail roads	6.75¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, add 25¢.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$6.75	$13.50

CLAD STEEL

Base prices, cents per pound

Stainless-clad	Plate	Sheet
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa.	24.00*	22.00
Nickel-clad 10 pct, f.o.b. Coatesville, Pa.	21.50	....
Inconel-clad 10 pct, f.o.b. Coatesville	30.00	....
Monel-clad 10 pct, f.o.b. Coatesville	29.00	....
Aluminized steel Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

*Includes annealing and pickling.

MERCHANT WIRE PRODUCTS

To the dealer f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per keg	Delivered San Francisco
Standard, galvanized and coated nails	$3.75†	$4.83
Cut nails, carloads, Pittsburgh base	5.30	....

†10¢ additional at Cleveland, 30¢ at Worcester.

	Base per 100 lb	
Annealed fence wire	$3.95‡	$4.96
Annealed galv. fence wire	4.40‡	5.41

‡10¢ additional at Worcester.

To the dealer f.o.b. Pittsburgh, Chicago, Birmingham

	Base column	
Woven wire fence*	84	107
Fence posts, carloads	90	...
Single loop bale ties	86	110
Galvanized barbed wire**	94	114
Twisted barbless wire	94	...

* 15½ gage and heavier. ** On 80-rod spools in carload quantities. †† Pittsburgh, Duluth.

HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Aldecor	Corten	Double Strength No. 1	Dynalloy	HI Steel	Mayari R	Otiscoloy	Yoloy	Y-50	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	American Rolling Mill	Great Lakes Steel
Plates	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	....	4.10
Sheets										
Hot-rolled	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	....	3.75
Cold-rolled	4.75	4.75	4.75	....	4.75	4.75	4.75	4.75	5.225*	4.55
Galvanized	....	5.40	....	....	....	5.40	....	....	....	....
Strip										
Hot-rolled	3.85	3.85	3.85	....	3.85	3.85	3.85	3.85	....	3.75
Cold-rolled	....	....	4.75	....	....	4.75	4.75	4.75	5.00*	4.55†
Shapes	....	3.85	....	....	3.85	3.85	3.85	3.85	....	....
Beams	....	3.85	....	....	....	3.85	....	....	....	....
Bars										
Hot-rol'ed	4.00	4.00	4.00	....	....	4.00	4.00	4.00	....	4.00
Cold-rolled	....	....	....	....	....	....	....	4.60	....	....
Bar shapes	....	4.00	....	....	4.00	4.00	4.00	4.00	....	....

* 21 gage and lighter. † Pittsburgh, add 0.10¢ at Chicago and Gary.

PIPE AND TUBING

Base discounts. F.ob. Pittsburgh and Lorain, steel buttweld and seamless. Others f.o.b. Pittsburgh only

Base price, $200.00 per net ton

Standard, threaded & coupled

Steel, buttweld	Black	Galv.
⅛-in.	55½	41
¼-in.	58½	45
1 to 3-in.	60½	47½
Wrought Iron, buttweld		
⅛-in.	2	+20
¼-in.	11½	+10
1 and 1¼-in.	17	+ 2
1½-in.	22½	1½
2-in.	23	2
Steel, lapweld		
2-in.	53	39½
2½ and 3-in.	56	42½
3½ to 6-in.	58	44½
Steel, seamless		
2-in.	52	38½
2½ and 3-in.	55	41½
3½ to 6-in.	57	43½
Wrought Iron, lapweld		
2-in.	14½	+ 5½
2½ to 3½-in.	17	+ 1½
4-in.	21	4
4½ to 8-in.	19	2½

Extra Strong, plain ends

Steel, buttweld		
⅛-in.	54½	41½
¼-in.	58½	45½
1 to 3-in.	60	48
Wrought Iron, buttweld		
⅛-in.	6½	+14
¼-in.	12½	+ 8
1 to 2-in.	22	2
Steel, lapweld		
2-in.	52	39½
2½ and 3-in.	56	43½
3½ to 6-in.	59½	47
Steel, seamless		
2-in.	51	38½
2½ and 3-in.	55	42½
3½ to 6-in.	58½	46
Wrought Iron, lapweld		
2-in.	17½	+ 2
2½ to 4-in.	26	8½
4½ to 6-in.	22	4

Basing discounts for standard pipe are for threads and couplings. For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all buttweld. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft, f.o.b. Pittsburgh in carload lots, cut length 4 to 24 ft, inclusive.

O.D. in.	Gage BWG	Seamless Hot-Rolled	Seamless Cold-Drawn	Electric Weld Hot-Rolled	Electric Weld Cold-Drawn
2	13	$15.29	$18.17	$15.00	$17.95
2½	12	20.57	24.43	20.11	24.07
3	12	22.87	27.18	22.26	26.68
3½	11	28.86	34.30	28.06	33.64
4	10	35.82	42.55	34.78	41.68

CAST IRON WATER PIPE

	Per net ton
6-in. to 24-in. del'd Chicago	$81.56
6-in. to 24-in. del'd New York	79.80
6-in. to 24-in., Birmingham	71.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles for all rail shipment; rail and water shipment less	95.00

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

	Percent Off List
½ in. & smaller x 6 in. & shorter	55
9/16 & ⅝ in. x 6 in. & shorter	52
¾ in. x 6 in. & shorter	49
1⅛ in. and larger, all lengths	48
Lag, all diam over 6 in. long	48
Lag, all diam x 6 in. & shorter	50
Plow bolts	57

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	48
9/16 to 1 in. inclusive	47
1⅛ to 1½ in. inclusive	45
1⅝ in. and larger	44

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts *Base discount less case lots*	U.S.S.	S.A.E.
7/16 in. and smaller	..	51
½ in. and smaller	48	..
½ in. through 1 in.	..	48
9/16 in. through 1 in.	47	..
1⅛ in. through 1½ in.	45	46
1⅝ in. and larger	44	..

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

	Consumer
Packages, nuts separate	60 and 10
In bulk	74

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$5.25
F.o.b. Lebanon, Pa.	5.40

Small Rivets

(7/16 in. and smaller)

	Percent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	55 and 5

Cap and Set Screws

(In packages)	Percent Off List Consumer
Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	56
Set screws, cup and oval points	61
Milled studs	33
Flat head cap screws, listed sizes	21
Fillister head cap, listed sizes	40

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Effective CaF_2 Content:	Base price per short ton
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer	$5.95
Old range, non-bessemer	5.80
Mesabi, bessemer	5.70
Mesabi, non-bessemer	5.55
High phosphorus	5.55

Prices quoted retroactive to Jan. 1, 1947.

METAL POWDERS

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh	23¢ to 27¢
Copper, electrolytic, 100 and 325 mesh	30¢ to 31½¢
Copper, reduced, 150 and 200 mesh	29¢ to 30½¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe	11¢ to 16¢
Swedish sponge iron, 100 mesh, c.i.f. N. Y., carlots, ocean bags	7.4¢ to 8¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	5¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots	66¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe	25¢ to 31¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	17¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢ to $1.75
Aluminum, 100, 200 mesh, carlots	23¢ to 26¢
Antimony, 100 mesh	36.05¢
Cadmium, 100 mesh	$2.00
Chromium, 100 mesh and finer	$1.025
Lead, 100, 200 & 300 mesh	18.50¢ to 23.50¢
Manganese, minus 325 mesh and coarser	33¢
Nickel, 150 mesh	51½¢
Silicon, 100 mesh	18.15¢
Solder powder, 100 mesh	8½¢ plus metal
Tin, 100 mesh	76.75¢
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.80
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb.	$2.65
Under 100 lb	$2.90

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$8.75 to $9.25
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	10.00 to 10.50
Foundry, Byproduct	
Chicago, del'd	$16.10
Chicago, f.o.b.	15.10
New England, del'd	17.25
Seaboard, Kearney, N. J., f.o.b.	15.35
Philadelphia, del'd	15.46
Buffalo, del'd	16.14
Ashland, Ohio, f.o.b.	13.35
Painesville, Ohio, f.o.b.	14.60
Erie, del'd	15.75
Cleveland, del'd	15.90
Cincinnati, del'd	15.39
St. Louis, del'd	15.85
Birmingham, del'd	12.35

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Carloads, Per 1000
First quality, Ohio	$57.00
First quality, Pa., Md., Ky., Mo.	65.00
First quality, New Jersey	70.00
Sec. quality, Pa., Md., Ky., Mo.	59.00
Sec. quality, New Jersey	62.00
Sec. quality, Ohio	51.00
Ground fire clay, net ton, bulk	9.50

Silica Brick

Pennsylvania and Birmingham	$65.00
Chicago District	74.00
Silica cement, net ton (Eastern)	11.50
Chicago	12.50

Chrome Brick

	Per Net Ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$59.00

Magnesite Brick

Standard, Balt. and Chester	$81.00
Chemically bonded, Baltimore	70.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks	$44.50
Domestic, f.o.b. Chewelah, Wash., in bulk	24.00
in sacks	28.00
Clinker (dead burned) dolomite, bulk, per net ton, f.o.b. York, Pa.	10.05

Midwest, add 10¢; Mo. Valley, add 20¢

WAREHOUSE PRICES

Base prices, delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP		Plates	Standard Structural Shapes	BARS		ALLOY BARS			
	Hot-Rolled (10 gage)	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled			Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Philadelphia	$4.24	$5.18	$5.29	$4.43	$5.28	$4.54	$4.22	$4.48	$5.38	$8.37	$8.37	$9.88	$9.88
New York	4.42	5.17[1]	5.47	4.62	5.40	4.72	4.37	4.62	5.42	8.42	8.42	9.92	9.92
Boston	4.50	5.12[12]	5.55[12]	4.65	6.356	4.80	4.47	4.62	5.468	8.62	8.62	9.97	9.97
Baltimore	4.09	....	5.14	4.40	....	4.39	4.34	4.45	5.35	....	....	....	....
Norfolk	4.35	....	....	....	....	4.50	4.50	4.75	5.50	....	....	....	....
Chicago	....	....	....	....	5.90	....	....	....	4.95	8.10	8.10	9.35	9.35
Milwaukee	4.199	4.799	5.249	4.199	....	4.499	4.249	4.249	5.149	8.399	8.399	9.649	9.649
Cleveland	4.00	4.60	5.238	4.188	4.95	4.30†	4.311	4.05	4.95	8.358	8.358	9.35	9.35
Buffalo	4.00	4.60	5.35	4.30	5.25	4.65	4.05	4.05	4.95	8.10	8.10	9.35	9.35
Detroit	4.15	4.75	5.42	4.34	5.24	4.59†	4.42	4.20	5.12	8.51	8.51	9.74	9.74
Cincinnati	4.116	4.716	5.166	....	....	4.803	4.444	4.403	5.303	....	....	....	....
St. Louis	4.199	4.799	5.424	4.199	5.424	4.499	4.249	4.249	5.324	8.574	8.574	9.824	9.824
Pittsburgh	4.00	4.60[1]	5.05	4.00	4.95	4.30	4.05	4.05	4.95	8.10	8.10	9.35	9.35
St. Paul	4.38[47]	5.034[1]	5.434[2]	4.404[7]	....	4.684[7]	4.434[7]	4.434[7]	5.726[6]	....	10.084[6]	....	11.726[6]
Duluth	....	....	....	....	....	....	....	....	....	....	....	....	....
Omaha	4.868	6.618[1]	5.918	4.868	....	5.168	4.918	4.918	5.818	....	....	....	....
Indianapolis	....	....	....	....	....	....	....	....	....	....	....	....	....
Birmingham	3.85[11]	....	5.20	4.00[11]	....	4.30[11]	4.05[11]	4.05[11]	5.83	....	....	....	....
Memphis	4.47	....	5.97	4.72	....	4.92	4.67	4.67	5.78	....	....	....	....
New Orleans	*4.46[11]	5.77[1]	....	....	....	4.83[11]	*4.68[11]	*4.78[11]	6.14	....	....	....	....
Los Angeles	5.35	7.00[1]	6.70	5.65	8.35[5]	5.20[12]	5.20[12]	5.10[13]	6.90[14]	9.65[10]	9.35	11.05	11.05
San Francisco	4.90[8]	6.30[9]	6.45	5.20[8]	....	5.00[8]	4.90[8]	4.75[8]	7.00[10]	....	....	....	....
Seattle	5.00	7.80	6.30	5.30[4]	....	5.25[4]	4.95[4]	5.00[4]	7.10	....	....	....	....
Portland	5.00[3]	....	6.25[9]	5.50[3]	....	5.40[3]	5.10[3]	5.10[3]	7.20	....	9.30	....	....
Salt Lake City	6.25	....	7.71	6.50	....	6.10	6.25	6.25	7.50[10]	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities: bars 1000 lb and over.

ALLOY BARS: 1000 lb and over.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 10,000 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999; (8) 400 lb and over; (9) 450 to 1499; (10) 500 to 999; (11) 400 to 3999; (12) 450 to 3749; (13) 400 to 1999; (14) 1500 and over.

* Add 46¢ for sizes not rolled in Birmingham.

† Up to ¾ in. thick and 90 in. wide.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums.

BASING POINT PRICES						DELIVERED PRICES (BASE GRADES)							
Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	34.00	34.50	35.00	35.50	.....	Boston	Everett	$0.50 Arb.	29.50	30.00	30.50	31.00	.....
Birdsboro	34.00	34.50	35.00	35.50	39.00	Boston	Birdsboro-Steelton	4.82	.....	.....	.....	.....	43.82
Birmingham	29.38	29.88	.....	.....	.....	Brooklyn	Bethlehem	3.00	37.00	37.50	38.00	38.50	.....
Buffalo	32.50	33.00	33.50	.....	.....	Brooklyn	Birdsboro	3.50	.....	.....	.....	.....	42.50
Chicago	32.50	33.00	33.50	34.00	.....	Cincinnati	Birmingham	4.87	34.25	34.75	.....	.....	.....
Cleveland	32.50	33.00	33.50	.....	.....	Jersey City	Bethlehem	1.84	35.84	36.34	36.84	37.34	.....
Duluth	33.00	33.50	34.00	34.50	.....	Jersey City	Birdsboro	2.33	.....	.....	.....	.....	41.33
Erie	32.50	33.00	33.50	34.00	.....	Los Angeles	Provo	5.94	38.94	39.44	.....	.....	.....
Everett	29.00	29.50	30.00	30.50	.....	Mansfield	Cleveland-Toledo	2.33	34.83	35.33	35.83	36.33	.....
Granite City	32.50	33.50	33.50	.....	.....	Philadelphia	Swedeland	1.01	36.01	36.51	37.01	37.51	.....
Neville Island	33.00	33.50	33.50	34.00	.....	Philadelphia	Birdsboro	1.49	.....	.....	.....	.....	40.49
Provo	33.00	33.50	.....	.....	.....	San Francisco	Provo	5.94	38.94	39.44	.....	.....	.....
Sharpsville	33.00	33.50	33.50	34.00	.....	Seattle	Provo	5.94	38.94	39.44	.....	.....	.....
Steelton	34.00	.....	.....	.....	39.00	St. Louis	Granite City	0.75 Arb.	33.25	34.25	34.25	.....	.....
Swedeland	37.50	35.50	36.00	36.50	.....								
Toledo	32.50	33.00	33.50	34.00	.....								
Troy, N. Y.	34.00	34.50	35.00	35.50	39.00								
Youngstown[1]	32.50	33.00	33.00	33.50	.....								

(1) Struthers Iron & Steel Co., Struthers, Ohio, charges 50¢ per ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base price for low phosphorous $40.50 per gross ton, f.o.b. Lyles, Tenn. Delivered to Chicago, $45.99. High phosphorous charcoal pig iron is not being produced.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$40.50; f.o.b. Buffalo—$41.75. Add $1.00 per ton for each additional 0.50 pct Si, up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Less ton lots (packed)	148.50
F.o.b. Pittsburgh	139.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Briquets—cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	6.40	6.65	7.20
Ton lots	7.30	7.90	9.80
Less ton lots	7.70	8.30	10.20

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$43.00	$44.00
F.o.b. Pittsburgh		44.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	30
L.c.l. lots	32

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.10% max. C, 0.06% P, 90% Mn	21.00	21.40	21.65
0.10% max. C	20.50	20.90	21.15
0.15% max. C	20.00	20.40	20.65
0.30% max. C	19.50	19.90	20.15
0.50% max. C	19.00	19.40	19.65
0.75% max. C, 7.00% max. Si	16.00	16.40	16.65

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.45
Ton lots	7.40
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet	6.15
Ton lots	7.05
Less ton lots	7.45

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, $56.00 f.o.b. Keokuk, Iowa; $52.75 f.o.b. Jackson, Ohio; $54.00 f.o.b. Niagara Falls. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe	14.65	16.90	18.65
97% Si, 1% Fe	15.05	17.30	19.05

Ferrosilicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si. 1 lb briquets.

	Eastern	Central	Western
Carload, bulk	3.85	4.10	4.30
Ton lots	4.75	5.35	5.65
Less ton lots	5.15	5.75	6.05

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
25% Si	11.65	...	...
50% Si	7.45	7.95	8.15
75% Si	9.25	9.55	10.30
80-90% Si	10.45	10.75	11.50
90-95% Si	12.05	12.35	13.05

Ferrochrome (65-72% *Cr, 2% max. Si*)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	23.00	23.40	24.00
0.10% C	22.50	22.90	23.50
0.15% C	22.00	22.40	23.00
0.20% C	21.50	21.90	22.50
0.50% C	21.00	21.40	22.00
1.00% C	20.50	20.90	21.50
2.00% C	19.50	19.90	20.50
65-69% Cr, 4-9% C	15.60	16.00	16.15
62-66% Cr. 4-6% C. 6-9% Si.	16.60	17.00	17.15

Briquets — contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	9.85	10.10	10.20
Ton lots	10.75	11.65	12.25
Less ton lots	11.15	12.05	12.65

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chrominum contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	16.70	17.10	17.25
Ton lots	17.90	19.20	20.00
Less ton lots	18.60	19.90	20.70

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

	Eastern	Central	Western
Carload	20.00	20.40	21.00
Ton lots	21.00	21.65	22.85
Less ton lots	22.00	22.65	23.85

Chromium Metal

Contract prices, cents per lb, chromium contained, carload, f.o.b. shipping point, freight allowed, 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C	83.50	85.00	86.25
0.50% max. C	79.50	81.00	82.25
9.00% min. C	79.50	81.00	82.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60.65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	13.00	13.50	15.55
Ton lots	14.50	15.25	17.40
Less ton lots	15.50	16.25	18.40

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	15.50	16.00	18.05
Ton lots	16.50	17.35	19.10
Less ton lots	17.00	17.85	19.60

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone; 3.5¢ for western zone.

	Cast Turnings	Distilled
Ton lots	$1.60	$2.35 $2.95
Less ton lots	1.95	2.70 3.75

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

	Eastern	Central	Western
Ton lots	13.50	14.60	16.55
Less ton lots	14.25	15.35	17.30

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

	Eastern	Central	Western
Ton lots	13.25	14.35	16.30
Less ton lots	14.00	15.10	17.05

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe.

	Eastern	Central	Western
Ton lots	13.25	14.35	16.30
Less ton lots	14.00	15.10	17.05

Other Ferroalloys

Ferrotungsten, standard, lump or ¼x down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained T, 5 ton lots, freight allowed... $2.05

Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.

Openhearth	$2.70
Crucible	$2.80
High speed steel (Primos)	$2.90

Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, per pound contained V_2O_5 $1.10

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb

Ton lots	$2.50
Les ton lots	$2.55

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo 95¢

Calcium molybdate, 40-45%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo 80¢

Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo 80¢

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo 80¢

Ferrotitanium, 40-45%, 0.10%C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti $1.23
Less ton lots $1.25

Ferrotitanium, 20-25%, 0.10%C max., ton lots, per pound contained Ti $1.35
Less ton lots $1.40

High carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton $142.50

Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. (Siglo) Tenn., $3 unitage per gross ton $65.00

Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.
Carload, lots 14.50¢

Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy
Carload, bulk 4.85¢

Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Niagara Falls, carload 6.25¢
Ton lots 6.75¢

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound
Car lots 9.00¢
Ton lots 9.75¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed.

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Less ton lots	$1.30	$1.3075	$1.329

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.055

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$2.10	$2.1125	$2.1445

Silcaz, contract basis, f.o.b. plant freight allowed, per pound.
Carload lots 35¢

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.

No. 1	87.5¢
No. 6	60¢
No. 79	45¢

Bortram, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Carbortam, f.o.b., Suspension Bridge, N.Y., freight allowed, Ti 15—17%, B 0.90—1.15%, Si 2.5—3.0%, Al 1.0—2.0%.
Ton lots, per pound 8.0¢

AGA Conference Includes Talk on Controlled Atmospheres

Boston

• • • **The use of controlled** atmospheres in gas furnaces to restore the carbon to surface decarburized steels was reported to be one of the more significant metallurgical advances dependent on the use of gas at the American Gas Assn. Conference on Industrial and Commercial Gas held here last week by C. E. Cullen, chief metallurgist, Surface Combustion Corp., Toledo, Ohio.

Decarburized steel surfaces, Cullen said, reduce the physical properties of steel parts which, when subjected to stresses, may require heavier section thicknesses or to have their decarburized surfaces machined away to compensate for the lower physicals. Now it is possible to restore the original carbon to the surface of the steel by careful furnace atmosphere control and so reduce costs.

One steel producer was said by Cullen to be already supplying heat treated rod and bar stock annealed in a suitable atmosphere to restore the original surface carbon content. Formerly such stock was sold only at a high premium required by the necessity for surface grinding.

A companion development is the surface atmosphere control of decarburization, scaling and oxidation of steel surfaces at the temperatures required for heat treatment or preheating for forming operations. Medium or high carbon steel parts which are to be stressed in service may be protected by heating in suitable muffles containing an enriched nitrogen atmosphere.

Precise control of carbon bearing gases for heat treating also extends into the carburizing field, Mr. Cullen said. Gas carburizing is tending to displace a portion of the established pack carburizing equipment because control of carbon concentration in the outer portions of the carburized cases is so important to the physical characteristics of the carburized part. The carbon content may be varied as desired in gas carburizing from as low as 0.75 pct to as high as 1.3 pct, Cullen said.

Another important development

Discussion Covers Method Used To Restore the Carbon To Decaburized Steels

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is dry cyaniding, a gaseous process in batch or continuous furnaces, in which the quenched product is essentially the same as obtained from the salt bath treatment. By slow cooling, this process can produce file hard surfaces, an important consideration where distortion is a consideration.

The bright annealing of copper has long been practiced under atmosphere control. The most promising development for minimizing surface defects during the heating of brass and bronze products, Cullen said, is the use of a nitrogen atmosphere with carefully controlled water vapor content.

It is in the mold baking that precision casting encounters the greatest variables causing non-uniformity, according to Paul L. Butler, foundry superintendant, J. R. Wood Products Corp., Brooklyn, N. Y.

Ideally, the heat should penetrate the flask from the bottom up, with only slight penetration from the sides and top in order to avoid flasks which are not thoroughly baked-out together with others that are over-baked.

At present, two types of dewaxing methods are used. The first is a set-up similar to a steam table in a restaurant. The other method is to place the flasks in a furnace, usually a hearth type, and to allow the flasks to remain in the furnace for the complete heating cycle. This type, which involves less handling, may be of the conventional hearth type, side fired, or the conveyor type, top fired, in which the heating cycle is by zones in place of steps on a control cycle.

Either method subjects the

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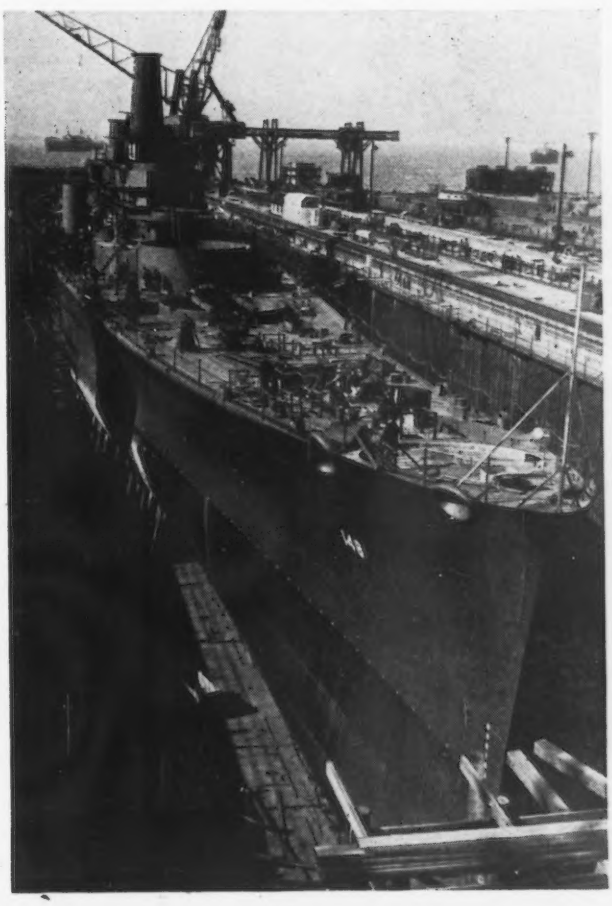

flask to a certain amount of heat shock which may result in cracked investment, producing castings with fins. New developments in furnace design for ideal heating of the flasks should start the heat at the bottom or sprue end of the flasks and progress upwards until all of the wax is melted, Butler said. After dewaxing, the heating cycle should progress in a smooth ascending curve until maximum temperature is obtained. There should be no sudden changes in temperature, and the atmosphere should be oxidizing in order to burn out any carbonaceous residue resulting from the dewaxing stage.

The melting of metals for precision casting is a unique process in itself. The melts are usually small but each melt must be controlled since small variations in temperature or in gas absorption cause rejections. Aluminum, copper base and magnesium alloys are especially prone to pick up gas in a furnace atmosphere. An oxidizing atmosphere is necessary whenever the furnace flames come into contact with the molten metal.

All sorts of mechanisms are used to assure a minimum of gas pick-up. Methods are employed such as covering the metal with protective flux, covering the crucible with a special tight fitting cover or even by cementing the crucible to the side walls of the furnace so that the furnace gases do not come in contact with the molten metal.

After melting, the metal must be transferred to a ladle in order to transport it to the flask casting area. The heating of this ladle is important, said Butler, because gases absorbed during heating are transferred to the metal.

The control of atmosphere is highly important to prevent scale or carbon loss on the surface of steel. Highly reducing atmospheres must be avoided on the copper base metals to prevent absorption of hydrogen. Accurate temperature control is necessary in the heat treatment of beryllium copper alloys.

The production of the injection mold from the matrix metal, an alloy of lead, tin, antimony, bismuth and zinc, requires controlled heat. Overheating tends to vaporize zinc; an excessively oxidizing atmosphere oxidizes the melt so that it is unsuitable for use as mold metal.

Accurately controlled heat is required in the blending of wax components to make the wax used for pattern injection. Thermostatic controls to prevent overheating and loss of wax constituents by vaporization maintain the proper wax shrinkage characteristics which result in uniform dimensions.

The reclamation of millions of tons of brass battle scrap in the present shortage of copper and zinc directs attention to the distillation of these metals in an inert gas atmosphere, according to W. A. Darrah, president, Intercontinental Engineers, Inc., Chicago.

Work done by Revere Copper and Brass Inc. and others led to the development of a process by which the zinc could be distilled from the copper at 3500°F, recovering both metals in marketable form. Furnace atmospheres for this work must be free of water vapor, carbon dioxide and carbon monoxide. Hydrogen must be maintained low and the atmosphere should consist principally of nitrogen.

The separation of aluminum from aluminum alloys involves still more exacting atmosphere problems, according to Darrah. Scrapped airplanes, for example, include very little pure aluminum; they are made up of a heterogeneous mixture of aluminum alloys. If such aluminum scrap is pre-treated in a melting furnace and then subjected to distillation in a controlled atmosphere, commercially pure aluminum which commands a much higher value may be separated from the mixture.

Hydrogen is most readily absorbed by aluminum, which is objectionable if the metal is to be rolled or extruded. Even nitrogen is absorbed to some extent, but it is generally considered the least harmful of the cheaply available gases. Water vapor is perhaps one of the most undesirable elements in treating aluminum and any inert gases used for this purpose must be most thoroughly dried.

The so-called rarer gases, of which argon is perhaps the most readily available, are excellent for the purpose, but somewhat costly. The addition of chlorine and sometimes sulphur to the inert atmosphere in the distillation of aluminum appears to offer improved results.

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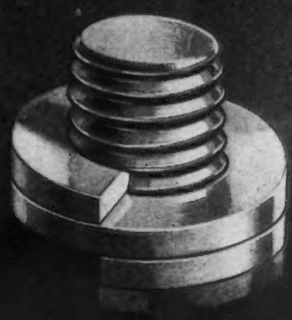

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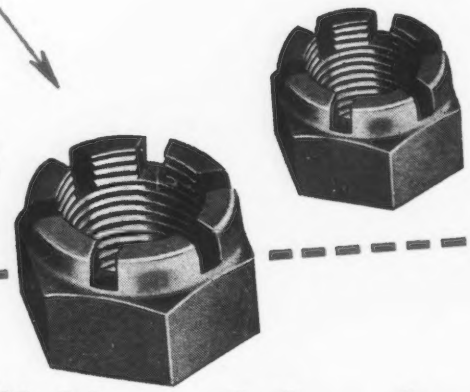

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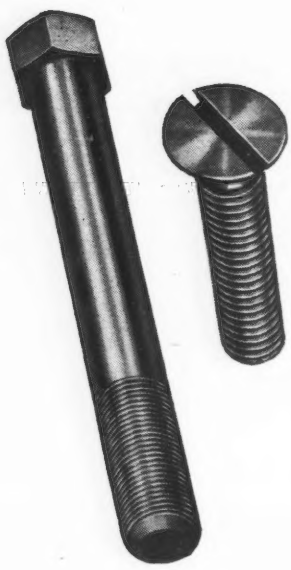

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AFA to Present Medals And Memberships At 51st Annual Convention

Chicago

• • • **The American Foundrymen's** Assn., worldwide technical society of the castings industry, will award four "meritorious service" gold medals and two honorary memberships at its 51st annual convention in Detroit Apr. 28-May 1, F. J. Walls of International Nickel Co., Detroit, board of awards chairman, has announced.

Russell J. Allen

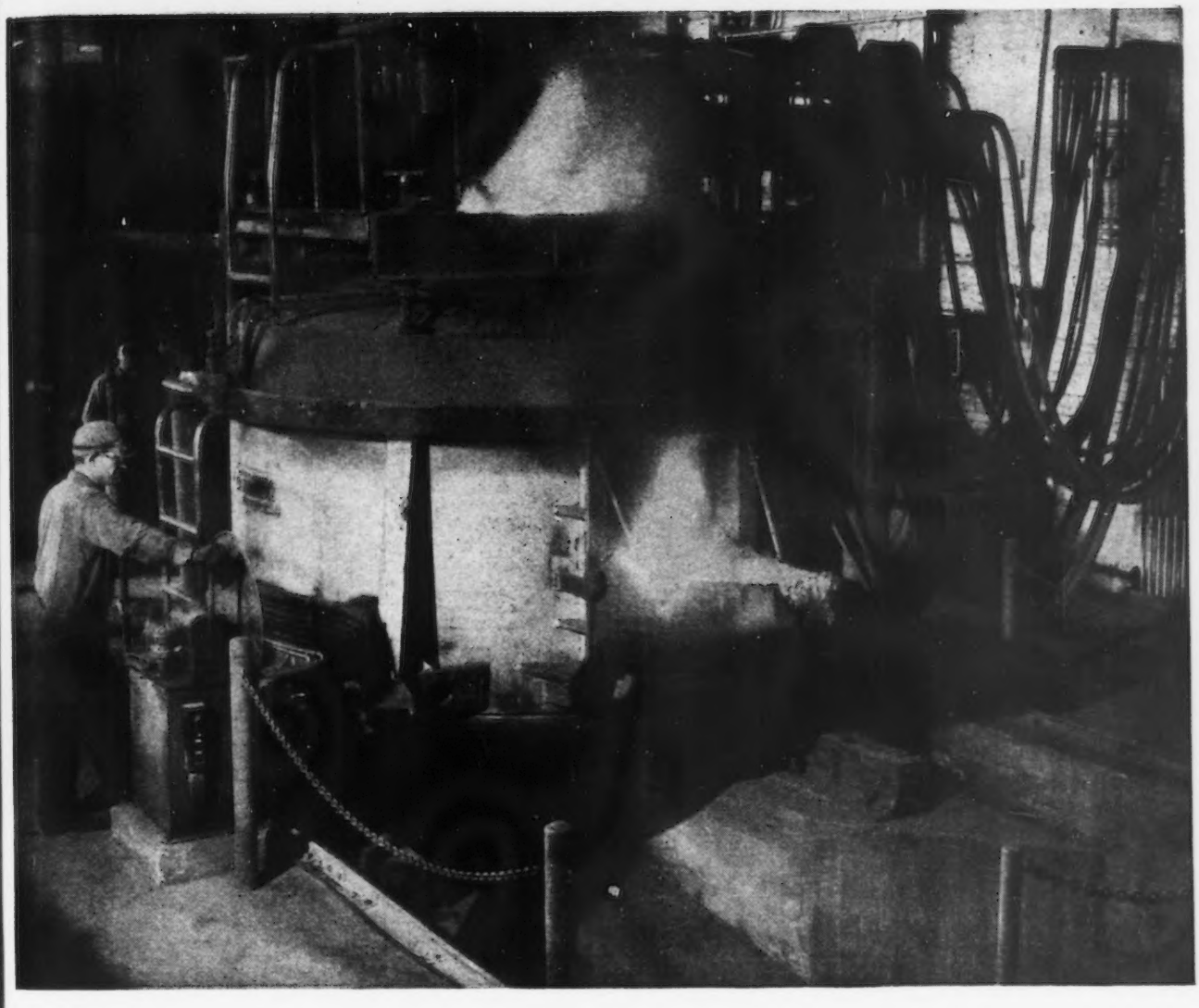
Russell J. Allen, metallurgical engineer, Worthington Pump & Machinery Corp., Harrison, N. J., cited "for his earnest and unceasing contributions toward the advancement of gray iron technology." Chairman of the society's gray iron division program and papers committee, Mr. Allen, connected with Worthington since 1929, is to be 13th recipient of the John A. Penton medal founded in 1923.

Dr. Richard A. Flinn

Dr. Richard A. Flinn, named for the Peter L. Simpson medal in recognition of "outstanding" work during the past year "in the field of chilled and white irons." He is metallurgist with the Mahwah, N. J., research group of American Brake Shoe Co., New York, and engaged in the development of heat and wear resistant ferrous alloys.

Harry M. St. John

Harry M. St. John, brass foundry and forge shop superintendent, Crane Co., Chicago, awarded the Wm. H. McFadden medal for "outstanding work in the field of nonferrous cast-



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ings research over a period of many years." Nationally recognized as a nonferrous technologist, Mr. St. John has a long record of AFA service as a member of its brass and bronze division and as chairman of the annual lecture committee.

Henry Washburn

Henry Washburn, president, Plainville Casting Co., Plainville, Conn., and 38th president of the society. Selected to receive Joseph S. Seaman medal, Mr. Washburn was cited "for outstanding service to the association and valuable contributions to the gray iron castings industry." A former director of the society, he was its president in 1939-40.

John Grennan

John Grennan, instructor in foundry, University of Michigan, Ann Arbor, and Sheldon V. Wood of Minneapolis, president of AFA and president-general manager, Minneapolis Electric Steel Castings Co., will be inducted as honorary members. Mr. Grennan, who has taught foundry practice since 1910, was cited "for long service to the association, collaboration in technical papers of value to the industry, and for constantly encouraging young men to enter the castings industry."

Sheldon V. Wood

Mr. Wood will retire as president of the society in July to serve a 1-year term as a director.

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Sees Gas From Burning Coal Mine Providing A New Type Heat Source

Milwaukee

• • • **Gas considered** suitable for the manufacture of synthetic fuel is now being produced in a burning mine at Jaspar, Ala. This development is regarded by officials of the Allis-Chalmers Mfg. Co. as an important heat source. The successful burning of coal underground was revealed in a recent U. S. Bureau of Mines release.

R. C. Allen, manager and chief engineer of the Allis-Chalmers steam turbine department, in commenting on the joint Bureau of Mines and Alabama Power Co. project, believes that the heat available from such underground burning of coal might be utilized in a steam plant, a gas turbine plant, or as fuel for industrial furnaces. The utilization of such power depends upon important factors such as the location of a given coal deposit in relation to the load center and the relative costs of transportation of the gas and the electric power.

The Allis-Chalmers official also pointed out that where a power load factor is high and the coal body is near, an ample supply of cooling water for condensing purposes would be necessary, and the best use of the gas from the process would probably be in a modern high pressure, high temperature steam generating station. The gas could be burned under steam boilers and electricity produced by steam turbine generating units.

Mr. Allen also said, "It is probable, too, that gas turbines can be very effectively utilized to generate electric power at the mine from gas derived directly from subterranean gas producing process. Since gas turbine power plants do not have the water requirements that steam plants do, the former would work to a maximum advantage in locations where water is scarce."

This possible new source of liquid fuel has focused attention on the gas turbine as a prime mover for driving locomotives or ships and steady advances are being made in the application of gas turbines for aircraft propulsion.

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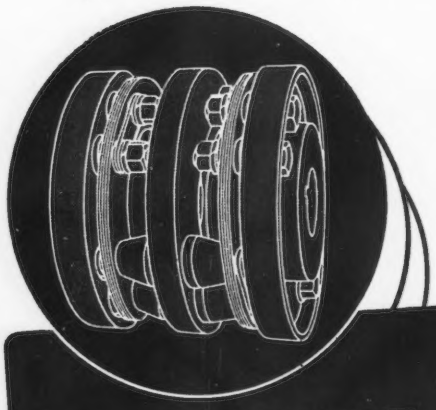

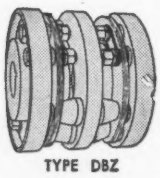
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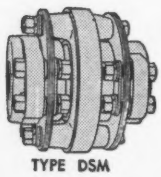
TYPE DSM

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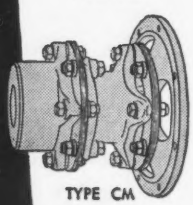
Flexible COUPLINGS
provide for
Angular and Parallel
Misalignment as well
as Free End Float . . .
and Eliminate
BACKLASH, FRICTION,
WEAR and CROSS-PULL
NO LUBRICATION IS REQUIRED!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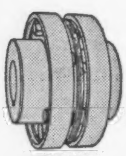
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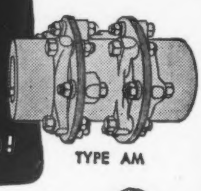
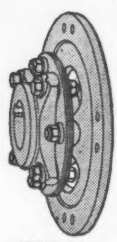

TYPE AM

The Thomas All-Metal Coupling does not depend on springs, gears, rubber or grids to drive. All power is transmitted by direct pull.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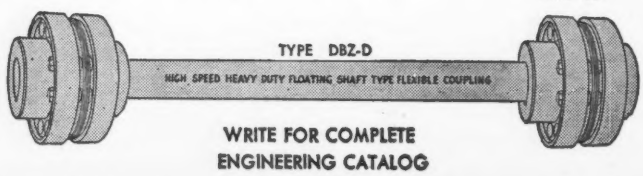

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All of which should receive a further impetus from the recently announced Bureau of Mines development.

According to the Bureau of Mines, the Alabama mine is one of several abandoned or unmined coal deposits having little economical value which will be ignited to provide additional experiments. An average of 35 to 50 pct of the coal is left in the ground in present mining operations, according to the Bureau reports.

Westinghouse Appliance Div. Sets Order Record

Pittsburgh

• • • **A dollar volume** of business in January and February of this year, 20 pct greater than any 2-month period of consumer production in the history of the Westinghouse Electric Corp.'s Appliance Div., was reported by J. H. Ashbaugh, vice-president. The upswing in dollar volume of business for the appliance division was announced at the opening of a series of field meetings for major distributor salesmen throughout the country.

The 20 pct increase in dollar volume recorded in the first two months of this year, of course, reflects the higher cost of production, but it is also a very healthy sign that steady production has been maintained, according to Mr. Ashbaugh. The major limiting factor in production now is materials, and this situation is being seriously aggravated by the current box car shortage.

He pointed out that the box car shortage is far more serious than the average person realizes, and warehouse facilities even now are being used to a maximum point. The car shortage not only curtails the company's ability to deliver finished appliances, but poses an equally serious problem of getting raw materials to the plant at Mansfield and to the division's other plant at East Springfield, Mass., in quantities and on time to meet production schedules.

In an effort to ease this situation, division officials have appeared before Senate hearings on the problem, but only slight relief has followed such efforts.

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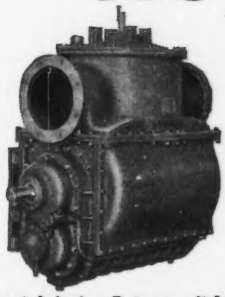
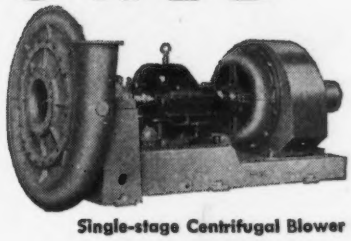
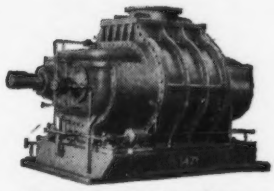


Special design Rotary unit for scavenging Diesel engine

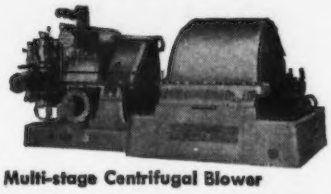


Single-stage Centrifugal Blower

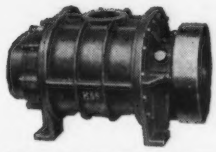


Rotary Positive Gas Pump

Positive Displacement Meter



Multi-stage Centrifugal Blower



Small Rotary Positive Blower for separate or built-in mounting

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You get a plus-value when you bring your air or gas handling equipment problems to Roots-Connersville. That's because of our *dual-ability* to engineer and build either the Centrifugal or Rotary Positive types of Blowers, Exhausters and Boosters. Completely independent thinking permits us to supply exactly the right unit for your needs.

Roots-Connersville also builds Positive Displacement Meters, Liquid and Vacuum Pumps and Inert Gas Generators, in a wide variety of sizes and types. Our long experience assures completely satisfactory performance, resulting from advanced engineering plus precision workmanship.

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Ventilating a tunnel: Fresh air was carried eight miles inside a mountain tunnel by using a large R-C blower at each portal with a portable booster inside, which advanced with the work. A substantial amount of time was thus saved after blasts, and workmen were always supplied with clean, fresh air.

Keeping fish air-conditioned: Aeration from R-C blowers keeps fish alive and active while being transported in fresh water tanks, by train, from Minnesota lakes to eastern seaboard. Unique drive methods combine gas engines, electric motors and power from the axle of the railroad car.

Preventing mine explosions: Inert rock dust was driven by an R-C Blower through a 3½" hose from the portal to exact spots where explosives were being used. By a "smothering" action, this inert dust prevented accidental explosions.

At your service: Examples of unique and profitable use of Roots-Connersville Blowers and other equipment abound in every industry. If you have a problem which you think might be so solved, R-C *dual-ability* will go to work for you. Write us without obligation.

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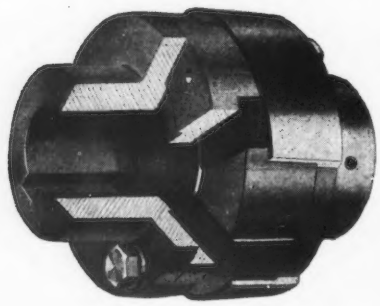
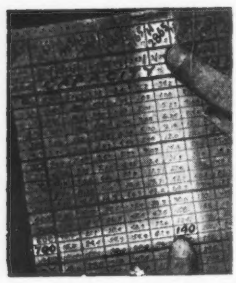


Pat. & Pats. Pend.



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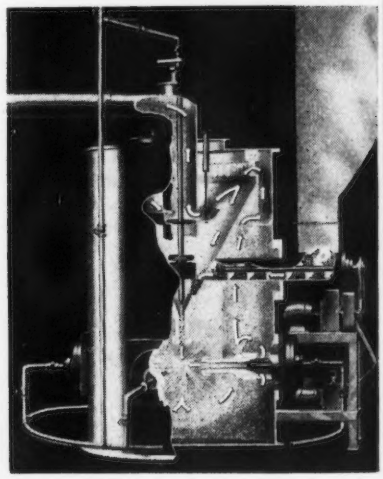
FAIRFIELD for FINE GEARS

Combustion Machinery Makers Developing New Coal Fired Equipment

Pittsburgh

• • • **The comprehensive** research program now being pushed by the coal industry is supported in many ways by the efforts of fuel users and by the makers of combustion equipment. Engineers throughout industry continue to extract new efficiency from coal and to develop equipment that helps to reduce smoke and fly ash.

An example of this effort on the equipment front is a new pulverizer developed by Blaw-Knox Company that enables power and steam plants to feed coal to their boiler burners in a fluid stream. Known as the steam jet fuel pulverizer, it is produced in two models, a loop model and a circular type unit. The loop model of the pulverizer was publicly revealed for the first time at the recent power show in New York.



Blaw-Knox circular steam pulverizer.

The unusual thing about this device is that it has no moving parts, except for a screw drive that feeds fuel into the unit. Superheated steam does the pulverizing. The powdered coal is then entrained by steam and delivered to the burners in a fluid stream, much like a gas. This stream-like movement of the fuel provides a high safety factor and permits precise control. Engineers report that the fluid-like coal achieves very complete combustion. As a result formation of smoke is re-

uced to a negligible quantity and y ash is confined to mineral and nburnable residue.

A production installation has been in service in a plant at Chillicothe, Ohio, for the past three years. Independent engineers were engaged to check on the results obtained from this unit. On the basis of favorable results reported in this survey and confirmed in the experience with two other units in service at Buffalo, the the company announced the development and scheduled production of the pulverizer.

Tests in the independent survey revealed that the finely divided coal particles from the pulverizer (better than 90 pct through a 200-mesh screen) produced an average dust loading per cu ft of flue gas definitely less than the permissible limit prescribed by the smoke ordinances of most large cities. This ability to comply, in most cases, with ordinances covering smoke and fly ash is achieved without the need for special auxiliary equipment for removal of fly ash.

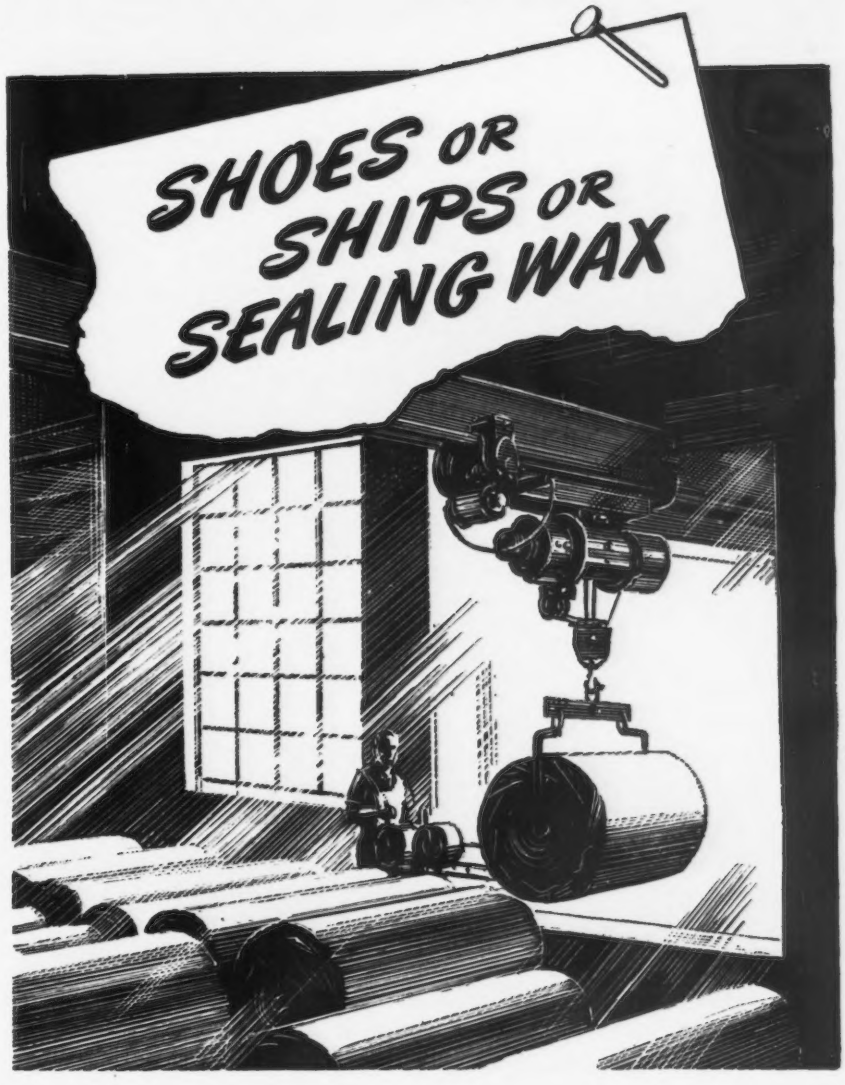
The pulverizer operates on either wet or dry coal; that is, the coal need not be pre-dried. The absence of moving parts, except for the screw feed, reduces maintenance. The units are small in size and due to their vibrationless operation, can be set on ordinary floors without special foundations, nor is bolting to the floor necessary. They are adapted for capacities up to 10,000 lb of fuel per hr as required.

The steam may be separated from the coal at the burners, or in successive stages before it reaches the burners; or, if desired, it may be sent through the burners into the boilers. The first alternative would be typical practice for most power and steam plants and would permit the use of the residual heat in the steam to preheat the intake air or feed water, or to do other useful work.

An "electric eye," trained on the flame at the boiler burners, insures automatic stoppage of the pulverizer in event of loss of ignition due to any cause.

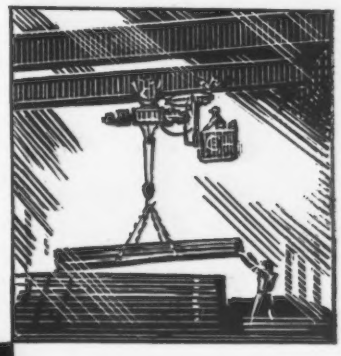
A circular model is adapted for use in pulverizing a variety of solid fuel including anthracite, bituminous coal, semi-bituminous or coke breeze.

This mill is said to be unique in



Regardless of what you make, it's safe to assume you have the problem of lifting, moving and depositing raw materials, semi-finished or finished products. Where such loads involve weights from 1/8 to 20 tons and where they must be handled smoothly, easily, economically and efficiently, consider the advantages of Shepard Niles hoists.

America's oldest builder of electric hoists and cranes offers you more than 5,000 styles and sizes from which to make your selection. Without obligation on your part, trained, experienced Shepard Niles engineers will study your requirements and recommend the hoist most suitable for the job.



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Moving heavy loads, indoors or out, is no job for human muscles or inefficient handling equipment. If you want to extend your improvements in shop practice to material handling, ask Shepard Niles engineers to assist you in selecting the electric crane to handle your loads with speed, safety and economy.

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the sense that for the same steam consumption per hr it will pulverize almost equal quantities in lb per hr of anthracite, bituminous coal, and coke breeze. These three fuels ordinarily are widely separated in Hardgrove grindability index factor. The performance of the circular mill in almost eliminating the effect of grindability factors on capacities is reported to be valuable and makes it a general utility pulverizer whose performance can be predicted despite required changes in fuel.

Pulverization is accomplished by high velocity impact expansion of the fuel, which is acted upon through nozzles and high temperature. In general, the mill uses from 0.05 to 0.06 lb of steam per lb of fuel pulverized when steam recovery system is used; pulverization is 90 pct or better through a 200-mesh screen.

WAA to Hold Big Tool Sale

East Chicago, Ind.

• • • **One and three** quarters million dollars worth of war surplus were offered to priority buyers when a sale of machine tools and consumer goods began Apr. 2 at the WAA warehouse No. 4. Among the many items are electric driven pumps, dust collectors and blowers, small hoists of various types, hand trucks, hand operated lift trucks, electric panels, switches and starters, spare parts for generators and air cooled engines, oven thermometers, and various types of tanks.

Nearly $900,000 of the total is in single purpose machine tools. After the priority groups have been satisfied, the sale will be open to normal channels of trade on Apr. 9. Machine tools may be inspected by all prospective buyers on Apr. 2 and 3 and again on Apr. 7 and 8.

Reed-Prentice Sales Jump

Worcester, Mass.

• • • **Reed-Prentice Corp.,** Worcester, Mass., one of the first machine tool manufacturers to get into the plastic machinery making business, reports sales of $9,734,591 for 1946, as compared with $6,498,403 in 1945. Net 1946 earnings amounted to $1,318,295, equal to $3.67 a share; in 1945 the net was $301,898, or 84¢ a share.

British, U. S. Set Up In German Zones Four Joint Administrations

London

• • • **On Jan.** 1 four forms of joint administration came into existence in the British and United States Zone of Germany. *The London Times* has recently printed the following discussion of the new bodies. Three of these, the administrations for economics, food and agriculture, and transport, are executive. The fourth, for finance, is for the time being advisory. A joint manpower administration is also contemplated.

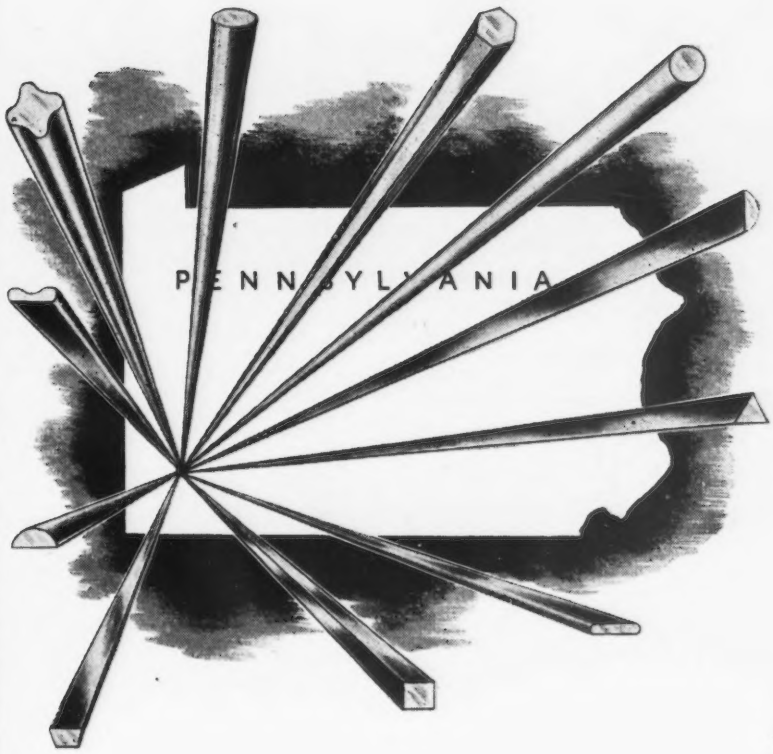
The fusion of the two zones is limited to certain specific functions. It is not accompanied by the creation of a bi-zonal government or state. Further, the fusion of the American and British Military Governments is not complete. Both remain politically and legally responsible for their respective spheres; nor is the control staff merged into one integrated unit, like Shaef, although the staffs engaged in the four fields of administration work in close coordination and all decisions are made jointly.

The four administrations are constructed on a uniform pattern. The largest and most complex of them is the Economic Administration. Its directing body is the Executive Committee for Economics, consisting of a nonvoting chairman and eight members, four from each zone although there is a difference in population—nearly 23 million in the British to nearly 17 million in the U. S. zone.

The United States, which has pursued a definite policy of federalization, considered the ministers for economics in the three *Lander* in the U. S. zone (Bavaria, Wurttemberg-Baden, and Greater Hesse) as the natural members of the committee.

The British zone has developed on a somewhat different pattern. During the past year a number of "functional" authorities, such as the Central Office for Economics, have been set up and gradually been given executive tasks. They worked through the administrations of the **Lander,** but were conceived as superior authorities on the lines of central administration as planned in the Potsdam

PAGE *Stainless Steel* WIRE



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Agreement. The British Government has, however, now largely adopted the American conception. The Central Office of Economics has been dissolved, and the representives for the British zone are now the ministers for economics in the *Lander*, North Rhine-Westphalia, Niedersachsen and Schleswig-Holstein.

The Economic Committee is competent to direct the economic administration of the two zones in nine specified subjects. These cover the main fields of economic planning; the principles of economic legislation, control of production as well as distribution of goods, price control, foreign and internal trade, and the control of public utilities.

This committee has constitutionally a dual character. It directs the basic principles of economic life in the two zones on lines binding upon all the participating *Lander*. It is, however, federal in its conception. Lacking a parliament to which it can be responsible, it derives its authority and power from the two Allied Military Governments, but the individual members are ministers of states which have or will shortly have democratically elected parliaments to which they are responsible.

The committe meets at least once a month to make decisions regarding principle, but the main burden of administration rests upon the bi-zonal office of administration which is constructed on the lines of the former central office for economics for the British zone. It employs nearly 1400 people.

Its head is the nonvoting chairman of the committee, and his election is inevitably a matter of some political significance. The committee which elected the first chairman, Dr. Rudolph Mueller, is much more conservative than its successor, which consists entirely of Social Democrats and has elected the Socialist Dr. Agartz, former head of the economic administration for the British zone.

In the present condition of Germany, however, the immediate tasks of alleviating an economic catastrophe overshadow controversial questions of policy. The most urgent tasks confronting the

bi-zonal committee are the raising of food and coal production, improvement of transport, distribution of urgent consumer goods, working out an import and export program.

There is little controversy among Germans regarding these matters, and no one disputes the need for far-reaching planning. The main problem is how to make such planning effective at a time when a desperate scarcity of everything impels most producers and consumers to acquire additional goods and materials through barter and uncontrolled trading.

The German committees are controlled by boards composed of equal numbers of U. S. and British representatives. The constitution and function of these boards mark a decisive change, especially in the British method of control. A small control group exercises supervision and decides on minor points of policy, while the bipartite control board in Berlin decides major policy. The many branches of the trade and industries division, such as the ferrous metallurgy subsection for steel, are being reduced to field inspectorates, with the main task of accurate intelligence and security control of German industry.

The day-to-day administration, including direct contact with German authorities and firms, is now entirely in the hands of the German administration, subject only to a general control on policy. Only coal and timber are still under executive allied control. The export and import program is worked out by a special department of the German administration and controlled by a special Anglo-American control agency.

The pattern of these administrations raises some major constitutional problems. The deliberate reluctance of the British and American Governments to cement the fusion by a political merger is due partly to their divergent political principles, but mainly to the desire not to prejudice the union of all four zones under a central German administration. This leaves these executive agencies in an anomalous situation.

They are not responsible to a parliament and not even part of a proper government. In fact, in order to dispel any such impres-

DON'T LET VIBRATION PUT A STOPPER ON PRODUCTION

Vibration represents part of the productive power of a machine escaping through the foundation on which it rests, and the result is decreased production efficiency.

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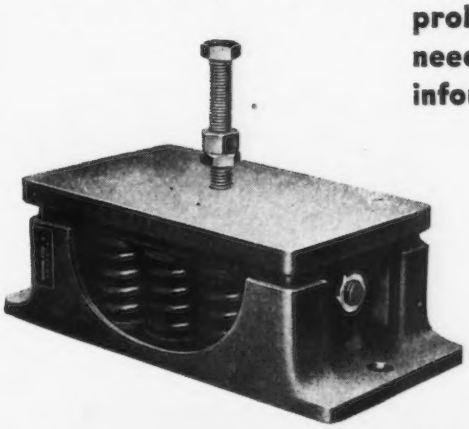
Korfund Steel Spring Isolators also save wear and tear on the machine, enable efficient production line arrangement and reduce noise and vibration within a building. Korfund Vibration Control Engineering applies the skill of years of experience in solving vibration problems to your immediate needs. Write for complete information.



Korfund Type LK Vibro-Isolator shown at left is of steel spring construction with resilient chocks at the corners to act as stabilizers. These inserts can be adjusted to the correct damping for the individual installation.

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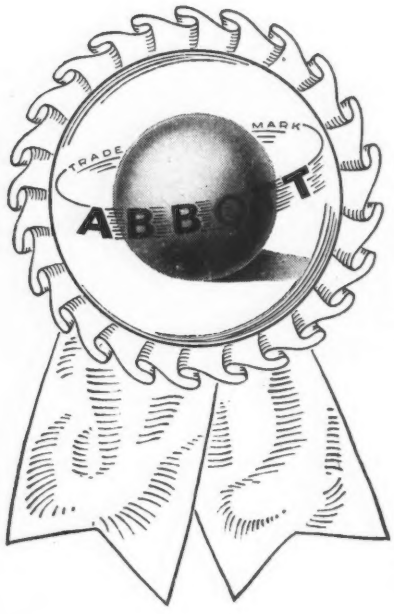

FIRST CHOICE PAST, PRESENT . . . AND FUTURE

THE ABBOTT BALL COMPANY, HARTFORD 10, CONN.

sion, the four administrations are located in four different places separated by hundreds of miles (Minden, Bielefeld, Frankfurt and Stuttgart). This complicates administration and coordination.

Through the composition of the committees an indirect parliamentary control is exercised by the participating *Lander*. This may be a source of strength, but it is more likely to endanger an effective central administration born of the need for general planning. The British Government has, however, moved closer to the American conception by shifting more emphasis on the *Lander*.

The present agencies must before long be either enlarged into quadrizonal authorities, which will be the nucleus of a German government, or else they will form the foundation of a western state. It is understandable that the latter alternative, which would be tantamount to a splitting of Europe, will not be encouraged before any hope of a central German administration under the joint control of the Four Powers has finally faded.

M. A. Hanna Co. Sets Up New Metallurgical Lab

Cleveland

• • • **Establishment of** a new metallurgical laboratory and research group under the direction of D. N. Vedensky, consulting research engineer of Berkeley, Calif., to study quality control at the beneficiation plants of iron ore mines under M. A. Hanna Co. management has been announced.

Planned for later in the year, this program is in addition to M. A. Hanna Co.'s participation with other companies in similar research being carried on at Battelle Institute, Columbus, Ohio.

The studies of beneficiation of iron ore are already in progress in the laboratories of the Pan-American Engineering Co., Berkeley, Calif., where Mr. Vedensky has been chief metallurgist since 1932.

Mr. Vedensky has previously been retained by M. A. Hanna Co. on several occasions. Among these assignments have been studies of the production of electrolytic manganese from low-grade domestic ores, and of the commercial beneficiation of low-grade and iron-manganese ores.

Information Free

(1) Portable Coolant Systems:

Designed to apply coolant directly and speed cutting 25 to 150 pct, portable controlled flow coolant systems for machine tools described in this folder incorporate flexible drive couplings on gear type systems, oil-less type bearings and automatic built-in pressure relief valves. Several models are listed with specifications and prices. *Gray-Mills Corp.*

(2) Endless Belt Loader:

For foundries, coal yards and other industrial installations, the Conveyall endless belt loader handles anything from a 300 mesh material to 2 x 8 in. egg size coal. Model illustrated in folder has a cleated belt to insure a full trough and even flow. Three models of Moto-Trimmers available with gas or electric motors are shown. Prices are included. *Bosworth Engineering Co.*

(3) Lift Truck Batteries:

Fully automatic Hertner type H multiple and single motor-generator battery chargers are offered in bulletins 101 and 102. Both are available either for lead-acid or nickel-alkaline batteries and can be supplied for practically any current requirements. Charging rate is automatically controlled. *Hertner Electric Co.*

(4) Pallet Box:

How to knock down box on pallets work is illustrated with a series of six photos and instructions in folder No. MH-805. Designed for interplant unit load shipments to eliminate packaging or bundling, the box is described as knocked down and ready for shipment in less than 30 sec. *Union Metal Manufacturing Co.*

(5) Motorized Hand Truck:

Features of Moto-Truc listed in booklet include frame and hydraulic pump designed to handle 4000 lb, air cooled ball bearing heavy duty motor, and double sprocket and chain to the drive wheel. Illustrations show units under actual operating conditions and specifications are included with diagrams. *Moto-Truc Co.*

(6) Shaper and Slotter:

Capable of conversion into a slotter in 15 minutes, Rhodes 7-in. shaper is featured with conversion equipment which consists of slotting attachment, in and out table and rotary table. Three and one half-in. vertical slotter with ram which can be set 10° from vertical to cut irregularly shaped pieces and relieve dies and which may be used without rotary table to increase machining capacity is included in folder. *Rhodes Manufacturing Co.*

(7) Molten Metal Pump:

Gusher molten metal pump which handles lead, babbitt, solder, zinc and other alloys at temperatures up to 1000°F with a delivery capacity above 1500 lb of metal per min as high as 6 ft above the pot level is illustrated in folder. Five models with and without water pumps are available. Six coolant pumps are included. *Ruthman Machinery Co.*

(8) Lapping Machines:

Precision flat lapping and roller lapping machines are described in two folders. Flat lapping machine is designed for highly accurate lapping of metals, glass, quartz or any other material where a finish as fine as 2 microinches is required. Lapping on roller type is done with abrasive compound spread on two precision ground rollers which revolve in self-aligning adjustable bearings. *Spitfire Tools, Inc.*

(9) Spot Welders:

Information in bulletin No. 50A concerns type 0 and type I foot operated Hot • spot welders in transformer capacities of 10, 15 and 20 kva and designed particularly for light sheet and wire goods fabrication. Type O welder has stationary lower horn holder in which horn can be rotated, reversed or adjusted in and out while type 1 has swivel lower horn holder which provides for vertical and side to side movement. *Acme Electric Welder Co.*

(10) Photographic Products:

Bulletin includes information on six Di-Noc sensitized vinyl transfers and materials and is designed to serve as an introduction prior to actual demonstration of products. All materials used in the manufacture of transfers as well as materials for permanently laminating transfers to base materials are manufactured to insure uniformity and stability. *Di-Noc Co.*

(11) Fork Lift Truck:

Advantages of Towmotor industrial trucks for material receiving and shipping operations as well as movement between production functions are outlined in two bulletins. Features include ability to lift and move loads up to 10,000 lb as fast as 880 ft per min, and to build stacks as high as 25 ft. Typical operations are illustrated with operating data and specifications. *Towmotor Corp.*

(12) Centrifugal Lubrication:

Operating principle of Onsrud centrifugal force controlled lubrication is explained in folder with supplemental cutaway view and illustrations. Lubrication is effected through a small control plug of porous material in spindle which permits passage of oil feed into bearing by centrifugal force of revolving spindle. *Onsrud Machine Works, Inc.*

(13) Emergency Power Plants:

Emergency power plants which start and stop automatically during power failure are described. Complete line of plants from 1 to 20 kw with direct or alternating current and prime movers are available. Plants are built to any required electrical specification. Folder is also available on gas-electric power plants for lifting magnet operation. *Power Plants, Inc.*

(14) Pipe Tools:

Ridgid line of pipe wrenches, threaders, cutters, vises and extractors are listed in booklet with numerous illustrations. Complete specifications and prices are given. New method of removing broken threaded ends is described with each step illustrated. *Ridge Tool Co.*

(15) Precision Shaper:

Performance features of Shape-Rite shapers designed to handle any class of work within 8-in. stroke capacity are listed in folder with illustration of model B and specifications. All working surfaces are ground, hand scraped and closely fitted for greater accuracy. *Sales Service Machine Tool Co.*

(16) Pressure Valves:

Background of requirements of continuous boiler blowdown valves and application of control valves to severe service is reviewed in catalog 102 which presents detailed information, prices and specifications on Strong block steel valves. Catalog 155-A contains information and data on pressure regulating valves, strainers and separators for steam, air and gas. *Strong, Carlisle & Hammond Co.*

(17) Torque Control Couplings:

Faster drilling and elimination of drill breakage with Buffalo machine tool type torque control couplings is described, with information on transmission type couplings included in bulletin 1010. Machine tool type units are available in six sizes to handle drills from No. 55 to 2⅛ in. *Buffalo Machinery Co., Inc.*

(18) Materials Handling Units:

Line of lift truck platforms, boxes, tiering box platforms and box platform units are illustrated in bulletin No. 600. Equipment is fabricated from cold pressed steel with corrugations formed with the grain of the steel. Accessories are available to meet all requirements. *Powell Pressed Steel Co.*

(19) Materials Handling:

Folder points out importance of special design trucks, hoppers, racks, skids, pallets and conveyors over standardized units in reducing material handling time and labor costs. Fabweld line includes self dumping hopper, reel truck, case dolly, mine truck, chip cart and many other specialized items which are pictured. *Fab-Weld Corp.*

NOTICE TO READERS: Offer limited to two months from date of issue

4/3/47

THE IRON AGE, New York 17, N. Y. 2

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INFORMATION FREE

(20) Casting Brochure:

Brochure of 54-p. deals with the procedures involved in casting aluminum, magnesium, bronze, brass and semi-steel as well as illustrating many of the more intricate shapes which have been produced. A compilation of technical information and casting specifications is also presented for engineers and purchasers to simplify design and procurement problems. *Howard Foundry Co.*

(21) Hard Facing Welder:

Developed for use with powdered Colmonoy hardfacing alloys, in conjunction with the Sprayweld process, which is said to combine the advantages of welding and metallizing, features of the Spraywelder are described and illustrated. Booklet also contains information of the Sprayweld process and alloys developed for this process. *Wall Colmonoy Corp.*

(22) Safety Goggles:

Eye protection equipment for a wide range of industrial applications is described in detail in catalog No. CE-29. Chippers goggles, chemical goggles, industrial spectacles, dust goggles, welders goggles, foundry goggles as well as specially designed eye protection equipment is described with illustrations. *Mine Safety Appliance Co.*

(23) Free Machining Die Steel:

Folder describes properties of Speed-Cut, a free machining medium carbon die steel which air hardens up to 275 to 325 Bhn and harder on large sizes with oil quench followed by pack hardening. Developed primarily for die casting dies for white metal alloys and plastic molds, its properties make it desirable for other tool and die applications. *Vanadium-Alloys Steel Co.*

(24) Generating Equipment:

Bulletin 231-2 contains general information, illustrations and specifications on Ready Power gasoline, gas and diesel engined generators. Units designed to provide self-generated, regular or standby electric power in the field are powered with International Harvester engines and are radio suppressed to prevent interference with the operation of standard broadcast receivers. *Ready Power Co.*

(25) Power Transmission:

Falk 30-p. coupling bulletin No. 4100 presents detailed illustrations and descriptions of complete line of steel couplings. Simplified selection tables for motor and turbine applications are included. Wider range of application for one type of coupling through standardization plus selection method is said to make possible greater accuracy in selection and simplifies installation. *Falk Corp.*

(26) Electric Furnace:

Hevi duty carburizer-nitrider electric furnace described in bulletin HD 646 provides circulation of furnace atmosphere to 1850° F, temperature uniformity through multiple zoning and is capable of operation to produce accelerated cooling outside the furnace with maintained protective atmosphere. Information on furnace construction, carburizing and nitriding procedure and gases, specifications and pit layouts are included. *Hevi Duty Electric Co.*

(27) Forged Steel Fittings:

Engineering and technical data reference book describes steps in production of forged steel screwed and socket welding fittings. Publication contains numerical index, pictorial index, specifications and diagrams as well as information on manufacturing standards, calculating wall thickness and stress, properties of pipe, and drop forgings manufactured by the company. *Ladish Co.*

(28) Porcelain Enameling:

Leaflet contains instructions on cleaning and pickling cycles for porcelain enamelers. Also described are the soak tank cycle and various uses for Pennsalt products in porcelain enameling. *Pennsylvania Salt Mfg. Co.*

(29) Gas Welding Equipment:

Revised catalog of gas welding and cutting equipment includes information on welding and cutting torches and outfits, regulators, and a variety of special purpose torches, tools and accessories. Illustrations and complete ordering information is included on all items and accessories. A portable machine which makes straight or circular cuts is featured. *Liquid Carbonic Corp.*

(30) Powder Metallurgy:

Containing all information published in the previous catalog on powder metal parts and bearings, the revised Keystone catalog includes many new sizes of plain bearings, flanged bearings and spherical type bearings. Of particular interest is the section devoted to the correct design of powdered metal parts. *Keystone Carbon Co.*

(31) Metallurgical Apparatus:

Laboratory equipment used in the preparation of metallurgical specimens for the inspection of ferrous and non-ferrous materials are featured in bulletin No. 850-1. Equipment is said to embody many exclusive features never before presented to laboratory technicians. Detailed information including specifications is included. *Precision Scientific Co.*

(32) Rheostats:

Rex rheostat catalog No. 3 includes a new 450w type designed with a floating contact element which is said to make sticking impossible due to graphite lubricated copper contact blocks. Good contact is said to be assured through self-adjusting equal contact pressure between slider bar and winding. Specifications on all types are included. *Rex Rheostat Co.*

(33) Flexible Couplings:

Latest 57-p. catalog covers complete line of flexible couplings available, including three new types designed specifically for use with outboard bearings, high speed drives between motors and gear reducers located some distance apart, and to meet the requirement for a flexible coupling capable of taking thrust. Detailed information is included on all types. *Thomas Flexible Coupling Co.*

(34) Pouring Equipment:

Complete line of Pour-Rite ladles, pouring systems and other foundry pouring equipment is described in Bulletin FY-144 and illustrated with over 50 photographs, 28 drawings and 30 specification tables to give prospective customers complete information on ladles for every purpose. Ladle handlers, monorail pouring systems and special ladles are included. *Whiting Corp.*

(35) Press Welders:

Press welders for spot and projection welding are listed in bulletin 3-113. Features include roller antifriction welding head, tap switches connected to transformer without flexing primary leads, provision for side mounted electrical controls, composite copper-steel knee construction, damage resisting transformer design and air valves mounted adjacent to air cylinders for low air consumption and high operating speeds. *Taylor-Winfield Corp.*

(36) Plastic Coating:

Properties, application data and typical uses of Ucilon, a protective coating for the electro-plating and metal finishing industry that resists severe corrosive conditions, are outlined in folder. Applications in chemical industries, oil refineries, food industries, paper making, public works and maritime industries are illustrated. *United Chromium, Inc.*

(37) Die-Less Duplicating:

Recent developments which have increased working range of DI-ACRO precision shears, brakes and benders which replace dies for both simple and complicated forming operations in model shops, experimental laboratories and production departments, are illustrated with typical products produced in catalog No. 46-11. Complete specifications are included on all equipment. *O'Neil-Irwin Mfg. Co.*

(38) High Strength Steels:

Properties, composition, application and uses of Aldecor, Cor-Ten and Double Strength steels developed to reduce dead weight and provide greater strength have been included in folder ADV 445 for the benefit of designers and builders of heavy mobile equipment. *Republic Steel Corp.*

(39) Gun Type Welders:

Claimed to speed spot welding operations in metal fabricating industries such as household appliance and hospital equipment where much spot welding work is not practical with ordinary spot welders, the spot welders described in bulletin 4640 are portable tools which can be taken to the work. Working sketches show several typical applications. *Federal Machine & Welder Co.*

(40) Steel Mill Lubrication:

Centralized lubrication systems as applied to blooming mill operation are reviewed in Steel Mill Lubrication, No. 11 of a series of booklets in Shell's "Facts That Help" series on industrial lubricating problems. Blooming mill lubrication is discussed as this typifies many of the lubrication problems of the steel industry. *Shell Oil Co., Inc.*

4/3/47

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Two Experimental Gas Turbines Now Under Construction at GE

Schenectady

• • • **Two experimental** gas turbines, one a 5000-kw machine for electric power stations, and the other a 4800-hp unit are being constructed by the General Electric Co.

Alan Howard, GE turbine-generator design engineer at Schenectady who headed design and development of the TG-100 Propjet and TG-180 jet engines, revealed that the company is also concentrating its facilities on gas turbine development in the nonaircraft field.

Shop tests of the 4800-hp turbine are scheduled to begin this spring. The stationary power plant is in the design stages and will not undergo factory tests until 1948.

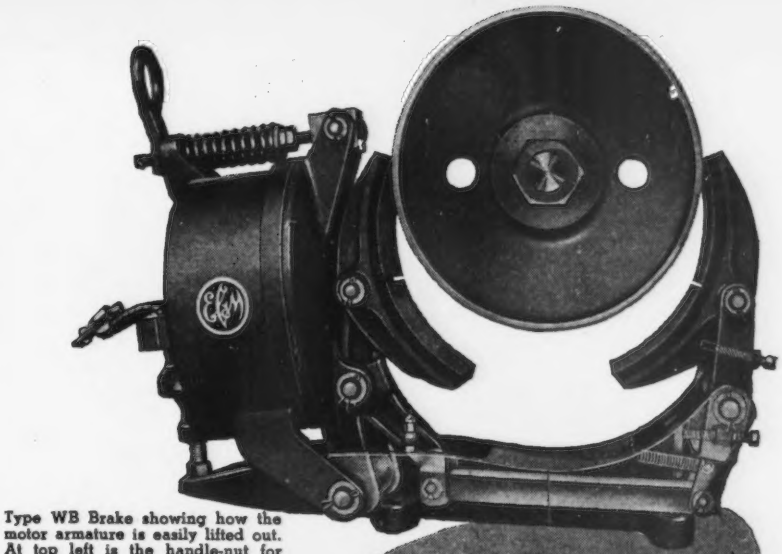
The 4800-hp gas turbine will burn Bunker "C" fuel, although work is being carried on in the use of pulverized coal in order to permit more diversified application of gas turbines. The 4800-hp unit being constructed is approximately 19 ft long and weighs between 2½ to 4 lb per hpr.

"We are making drawings," Mr. Howard said, "for a 5000-kw plant suitable for central station or industrial application. We believe this type of plant, when developed, will prove to have very competitive all-around economy and characteristics when compared with other types of plants in similar ratings."

In this stationary gas turbine, which also will be powered with oil, air flows through two compressors, an intervening intercooler, a regenerator and then into six combustion chambers. Nominal inlet temperature to the turbine is 1500 F, with the gases expanding first through a two-stage turbine which drives the high-pressure compressor. Turbine and compressor run at a constant speed of about 8700 rpm.

The rest of the expansion occurs through the single-stage low-pressure turbine which drives the low-pressure compressor.

GE turbine-generator engineers at Schenectady are engaged in extensive testing of various phases of gas turbine, and facilities for still further research are nearing completion, Mr. Howard said.



Type WB Brake showing how the motor armature is easily lifted out. At top left is the handle-nut for compressing the spring when removing motor armature, changing brake shoes and for manual control.

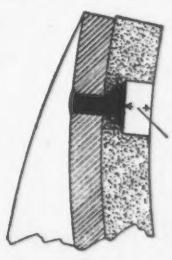
Long Life Brakes for A-C and D-C Motors by EC&M

The brake lining is molded to match curvature of wheel and shoe.

These Type WB Brakes for a.c. and d.c. service have a block type lining which is both thick and tough.

Furthermore, due to the process of manufacture, the blocks have proper frictional quality *throughout the entire thickness* permitting uniform and complete wear down to rivet heads. And since the material is non-compressionable, brake adjustments are infrequent.

EC&M Type WB Brakes are built in several sizes. They can be supplied with series or shunt-wound operating coils for direct current motors. On alternating current service, they are supplied in shunt-wound form for use with a compact rectifier-unit. Send for Bulletins 1004 and 1006 describing these long life brakes.



Actual wearing thickness, between rivet heads and brake wheel, is ⅛" on the smallest size to ½" on the largest size.

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*Pig Iron Production and Shipments—Net Tons**

Source—American Iron & Steel Institute

Production and Distribution by Standard Grades of Pig Iron
(Excluding Ferro Alloys)

Standard Grades	Total Production (by grades)		Shipments† Other than for "Own Use" (by grades)	
	December	1946	December	1946
1—Low Phos., Intermediate Low Phos. and Bessemer	521,510	6,307,477	56,958	592,207
2—Basic	3,017,052	**33,689,192	78,253	**1,210,888
3—Malleable	186,403	**2,051,241	162,147	1,925,606
4—Foundry	183,994	2,573,289	175,947	**2,416,748
Total	3,908,959	**44,621,199	473,305	**6,145,449
Percent of capacity operated by blast furnaces‡	69.9 Pct	67.4 Pct		

Distribution of Shipments Reported Above

	Shipments	
	December	1946
1—To Steel Ingot Producers (Open Hearth, Bessemer and Electric Furnaces) including Shipments to Independent Ingot Mold Producers	126,416	**1,568,786
2—All Other	346,889	**4,576,663
Total	473,305	**6,145,449

* Does not include blast furnace silvery, ferro-silicon, ferro-manganese, spiegeleisen, ferro-phosphorus, or electric furnace ferro-silicon, or other ferro-alloys.

** Adjusted.

† "Shipments" cover merchant shipments exclusive of shipments for "Own Use." It does not include pig iron-producers' tonnage for own department or plant consumption or for transfer to other plants of same company or affiliated company.

‡ As reported on AIS Form 7 for all companies producing pig iron and ferro alloys in blast furnaces.

*Pig Iron Production and Shipments—Net Tons**

Source—American Iron & Steel Institute

Production and Distribution by Standard Grades of Pig Iron
(Excluding Ferro Alloys)

Standard Grades	Total Production (by grades)		Shipments† Other than for "Own Use" (by grades)	
	January	To date this year	January	To date this year
1—Low Phos., Intermediate Low Phos. and Bessemer	731,979		91,017	
2—Basic	3,773,981		128,757	
3—Malleable	236,418		203,179	
4—Foundry	245,651		248,304	
Total	4,988,029		671,257	
Percent of capacity operated by blast furnaces‡	90.8 Pct			

Distribution of Shipments Reported Above

	Shipments	
	January	To date this year
1—To Steel Ingot Producers (Open Hearth, Bessemer and Electric Furnaces) including Shipments to Independent Ingot Mold Producers	162,656	
2—All Other	508,601	
Total	671,257	

* Does not include blast furnace silvery, ferro-silicon, ferro-manganese spiegeleisen, ferro-phosphorus, or electric furnace ferro-silicon, or other ferro-alloys.

† "Shipments" cover merchant shipments exclusive of shipments for "Own Use." It does not include pig iron-producers' tonnage for own department or plant consumption or for transfer to other plants of same company or affiliated company.

‡ As reported on AIS Form 7 for all companies producing pig iron and ferro alloys in blast furnaces.

Materials Having 0.05 Uranium, Thorium Need License for Transfer

Washington

• • • **On and after** Apr. 1, no person except those licensed by the Atomic Energy Commission may transfer, deliver, receive title to or possession of, or export from the United States any source material which contains as much as one-twentieth of one pct (0.05 pct) by weight of uranium, thorium or combination of these elements.

However, the Commission said in making the announcement, these restrictions do not apply to transfers or deliveries in any one month of uranium or thorium ores which contain less than 10 lb of these metals.

Nor do the limitations apply to the following manufactured products: Incandescent mantles; ceramic products; refractories; glass products; photographic films, negatives or prints; vacuum tubes, or certain other rare-earth metals and compounds.

These manufactures are exempted from licensing (except export control) since it is not generally feasible to extract any quantities of uranium or thorium from them. Also, after Apr. 1, no further supply of uranium will be offered for inclusion in most of these products except under exceptional conditions and a license will be required to export any article containing either element; this will be in addition to the standard export license issued by the Dept. of Commerce.

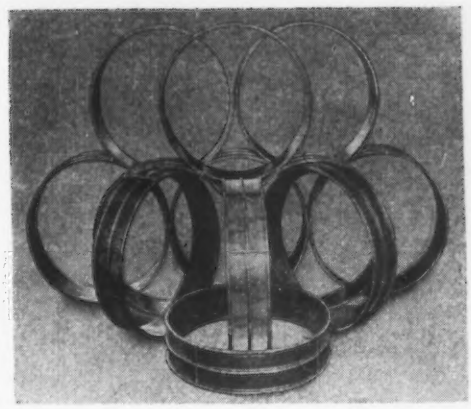
Licenses will be of two basic types—general and specific. The first will be issued to identified classes such as transportation agencies, doctors or druggists, etc., to permit transfers under certain recurring conditions without the necessity of filing for each individual operation; specific licenses are issued to all others and may authorize either single or continuing activity such as export.

All unlicensed holders of raw source materials which contain 10 lb or more of uranium or thorium or refined source material containing 1 lb of uranium or thorium or combination thereof are required to report the same to the Commission within 30 days after the order goes into effect or 30 days

Typical

of

HENDRICK WORKMANSHIP



These milled-slot screens, for centrifugal drying of various materials, are made of ⅛" stainless steel, and in their fabrication tolerances as close as plus or minus .0001" were maintained; an illustration of Hendrick's expert workmanship.

Hendrick offers unusual facilities for the manufacturing of many specialized products, of which these screens are a typical example. Write for detailed information.

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The man on the job has found that "TIGER GRIP" gives him more of everything he expects from a work glove! "TIGER GRIP" gives him *more* protection—because its specially knitted material contains hundreds of "loops" in every square inch, to cushion and protect the hand. He gets *more* wear — because these entirely different gloves outlast several pairs of ordinary woven fabric gloves! And he gets washability without excessive shrinkage! Treated with Johnson's "DRAX" to make it water repellent! ADVANCE Work Gloves are laboratory tested, and re-tested under actual working conditions!

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Big, new catalog lists full line of ADVANCE work gloves including leather palm gloves, flannel gloves, wire stitched gloves, welder's gloves, etc., as well as a complete line of safety and protective clothing for every industry.

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DETROIT 26, MICH.
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*Pig Iron Production and Shipments—Net Tons**

Source—American Iron & Steel Institute

Production and Distribution by Standard Grades of Pig Iron
(Excluding Ferro Alloys)

Standard Grades	Total Production (by grades)		Shipments† Other than for "Own Use" (by grades)	
	December	1946	December	1946
1—Low Phos., Intermediate Low Phos. and Bessemer	521,510	6,307,477	56,958	592,207
2—Basic	3,017,052	**33,689,192	78,253	**1,210,888
3—Malleable	186,403	**2,051,241	162,147	1,925,606
4—Foundry	183,994	2,573,289	175,947	**2,416,748
Total	3,908,959	**44,621,199	473,305	**6,145,449
Percent of capacity operated by blast furnaces‡	69.9 Pct	67.4 Pct		

Distribution of Shipments Reported Above

	Shipments	
	December	1946
1—To Steel Ingot Producers (Open Hearth, Bessemer and Electric Furnaces) including Shipments to Independent Ingot Mold Producers	126,416	**1,568,786
2—All Other	346,889	**4,576,663
Total	473,305	**6,145,449

* Does not include blast furnace silvery, ferro-silicon, ferro-manganese, spiegeleisen, ferro-phosphorus, or electric furnace ferro-silicon, or other ferro-alloys.

** Adjusted.

† "Shipments" cover merchant shipments exclusive of shipments for "Own Use." It does not include pig iron-producers' tonnage for own department or plant consumption or for transfer to other plants of same company or affiliated company.

‡ As reported on AIS Form 7 for all companies producing pig iron and ferro alloys in blast furnaces.

*Pig Iron Production and Shipments—Net Tons**

Source—American Iron & Steel Institute

Production and Distribution by Standard Grades of Pig Iron
(Excluding Ferro Alloys)

Standard Grades	Total Production (by grades)		Shipments† Other than for "Own Use" (by grades)	
	January	To date this year	January	To date this year
1—Low Phos., Intermediate Low Phos. and Bessemer	731,979		91,017	
2—Basic	3,773,981		128,757	
3—Malleable	236,418		203,179	
4—Foundry	245,651		248,304	
Total	4,988,029		671,257	
Percent of capacity operated by blast furnaces‡	90.8 Pct			

Distribution of Shipments Reported Above

	Shipments	
	January	To date this year
1—To Steel Ingot Producers (Open Hearth, Bessemer and Electric Furnaces) including Shipments to Independent Ingot Mold Producers	162,656	
2—All Other	508,601	
Total	671,257	

* Does not include blast furnace silvery, ferro-silicon, ferro-manganese spiegeleisen, ferro-phosphorus, or electric furnace ferro-silicon, or other ferro-alloys.

† "Shipments" cover merchant shipments exclusive of shipments for "Own Use." It does not include pig iron-producers' tonnage for own department or plant consumption or for transfer to other plants of same company or affiliated company.

‡ As reported on AIS Form 7 for all companies producing pig iron and ferro alloys in blast furnaces.

Materials Having 0.05 Uranium, Thorium Need License for Transfer

Washington

• • • **On and after** Apr. 1, no person except those licensed by the Atomic Energy Commission may transfer, deliver, receive title to or possession of, or export from the United States any source material which contains as much as one-twentieth of one pct (0.05 pct) by weight of uranium, thorium or combination of these elements.

However, the Commission said in making the announcement, these restrictions do not apply to transfers or deliveries in any one month of uranium or thorium ores which contain less than 10 lb of these metals.

Nor do the limitations apply to the following manufactured products: Incandescent mantles; ceramic products; refractories; glass products; photographic films, negatives or prints; vacuum tubes, or certain other rare-earth metals and compounds.

These manufactures are exempted from licensing (except export control) since it is not generally feasible to extract any quantities of uranium or thorium from them. Also, after Apr. 1, no further supply of uranium will be offered for inclusion in most of these products except under exceptional conditions and a license will be required to export any article containing either element; this will be in addition to the standard export license issued by the Dept. of Commerce.

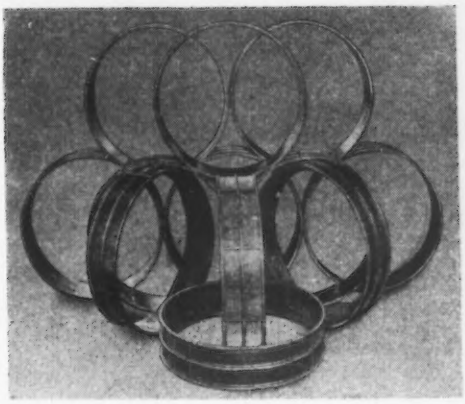
Licenses will be of two basic types—general and specific. The first will be issued to identified classes such as transportation agencies, doctors or druggists, etc., to permit transfers under certain recurring conditions without the necessity of filing for each individual operation; specific licenses are issued to all others and may authorize either single or continuing activity such as export.

All unlicensed holders of raw source materials which contain 10 lb or more of uranium or thorium or refined source material containing 1 lb of uranium or thorium or combination thereof are required to report the same to the Commission within 30 days after the order goes into effect or 30 days

Typical

of

HENDRICK WORKMANSHIP



These milled-slot screens, for centrifugal drying of various materials, are made of ⅛" stainless steel, and in their fabrication tolerances as close as plus or minus .0001" were maintained; an illustration of Hendrick's expert workmanship.

Hendrick offers unusual facilities for the manufacturing of many specialized products, of which these screens are a typical example. Write for detailed information.

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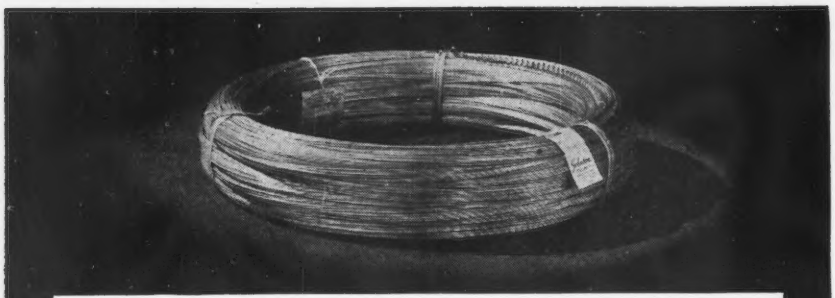

Aircraft Wire—tinned or alloy coated and galvanized
Armature Binding Wire—tinned or alloy coated
Belt Hook Wire—tinned, galvanized or alloy coated
Bobby Pin Wire
Brush Wire—round scratch brush, tempered and untempered. High strain white liquor finish
Card Wire—tempered, round, angular, single convex, double convex
Curtain Spring Wire—round, flat
Fish Leader Wire
Flexible Shaft Wire—Music Wire quality
Hard Drawn Spring Wire
Heddle Wire
Hose Reinforcement Wire
Mandolin Wire
Music Wire, bright, tinned or alloy coated
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after acquisition, whichever is later.

Handling of applications and issuance of licenses will be handled by the Commission's New York office. Application blanks (Form AEC-2) may be obtained from and should be mailed to the U. S. Atomic Energy Commission, PO Box 42, Station F, New York 16, N. Y.

Completes Plant Purchase

Pittsburgh

• • • **The Westinghouse** Electric Corp. has turned over to the War Assets Administration a check for $2,058,483 completing the purchase of the plant in Vanport, Beaver County, Pa., operated during the war by the Curtiss Wright Corp.

This sum included the balance due on the purchase price of the plant, less tax pro-rations. A payment of $231,052 was made last Jan. 13 when the sales agreement was signed.

The new plant will be occupied by the Westinghouse Standard Control Div. which has been located in East Pittsburgh, Pa. Employment of approximately 2000 persons with an annual payroll of $5 million is anticipated when operations are fully under way. J. A. Butts, manager of the division, estimated $20 million worth of control equipment will be produced annually in the new plant.

Blaw-Knox Net Gains

Pittsburgh

• • • **Total income** of Blaw-Knox Co. for 1946 amounted to $3,352,071 compared with $3,344,288 for the previous year. The 1946 income included $2,323,841 from nonrecurring charges and credits, the principal item of which was $1,871,238 transferred from reserve for war and postwar adjustments.

Net sales amounted to $46,068,338 which, after elimination of nonrecurring war business, was substantially in excess of the volume of prior peacetime years.

William P. Witherow, president, reported that 1947 began with a backlog of $31,500,000.

The London Economist

(CONTINUED FROM PAGE 115)

stepped out of the line in the Middle East and that the United States has stepped in? Have they compared the scale and impudence and effectiveness of their offer to Greece and Turkey with the Soviet handling of Persia?

To suggest the comparison may seem offensive, but it will certainly be made by those governments of Eastern Europe and the Middle East who have to weigh the risks of accepting American aid. These governments must realize that, in the short run, it is still the British who face the Russians on the line from Athens to Teheran; if they do not, the attempts being made in Congress to prevent the despatch of American troops should convince them. They may even recall that Britain has spent on Greece nearly £90,000,000 with little fuss, and that it is most explicitly bound by treaty to defend the integrity of Turkey, Greece, Egypt, Iraq and Transjordan.

To appreciate the dilemma in which, say, the Turkish and Hungarian governments might one day be placed by this policy of limited liabilities, an Englishman may consider how he is affected by the Texas speech. Britain too, having received its dollars, is asked to accept American leadership in a liberal ideology, economic not political. Britain too has been told that its independence and prosperity are a vital American interest, as was nobly proved by American fighting men.

Now the first reckoning is approaching. If at Geneva next month the Americans offer tariff concessions and pledges of economic cooperation, is Britain to surrender imperial privileges for the hope of freer trade and bigger markets? The offer is tempting. But the British are asked to commit themselves, perhaps beyond recall, in return for an unratified promise. Will the American voter support more liberal trade policies now and maintain them later?

The same doubts arise on both of President Truman's speeches for the same reasons. In the political sphere the foreigner doubts whether the development of long-range weapons has convinced Americans of their interest in European peace; in the economic sphere he doubts

Continuous
Inspection at Marbott

Finish-machining large units is no picnic! That's why a famous maker of automatic pipe welding machines specifies Marbott for these all-welded brackets. Accurate fabricating means a minimum of machining. From preliminary "tack" welding parts into exact position, to final "fillet" welding, it's a constant battle against plate distortion from torch heat. But, Marbott care, skill and vigilance is a quality-sure formula every time. Try it.

Heavy Steel Weldments
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UNIFORM HARDNESS
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O. K. SOLID STEEL SHEAR BLADES for maximum toughness and keen edge holding qualities. Recommended for heavy plate work. Made in 3 grades suitable for all jobs: O. K. BATTLE AXE for shearing up to and including 1/4 in. mild steel or equivalent, O. K. DURA-CHROME for shearing hot or cold plate steel up to 1 1/4 in. or equivalent, O. K. STANDARD for average runs and heavy plate shearing.

GANG SLITTERS are made to the same quality and specifications as O. K. SOLID STEEL SHEAR BLADES. Precision ground to ± .0002 tolerances on thickness, diameter, and bore—extremely high finish.

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with maximum speed and convenience

use **GRAND RAPIDS No. 4**

Universal Cutter and Tool Grinder

EXTREME FLEXIBILITY of the No. 4 Universal Cutter and Tool Grinder permits two ways of performing nearly every operation: 1. With the spindle head locked, the sleeve and knee swivel around the column; 2. With the sleeve locked the head swivels on the column.

VERSATILITY of the No. 4 Universal Cutter and Tool Grinder makes all of the following grinding jobs practical and simple:

GEAR CUTTER GRINDING
ANGLE CUTTER GRINDING
INTERNAL GRINDING
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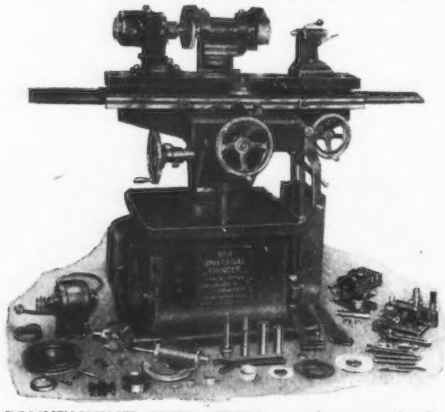
Write for Bulletin 1045



CONVENIENT OPERATION permits control of machine from either front or rear. Both power feed, providing 6 longitudinal table speeds, and equipment for wet grinding are available.

What "GRAND RAPIDS" Quality Means: Gallmeyer & Livingston cast their close-grained gray iron, machine to micrometric tolerances, and precision-assemble grinding machinery of unsurpassed performance. *Grand Rapids* means *top* quality grinding machinery.

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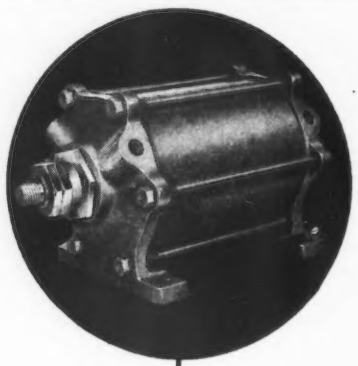

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with satin smooth cylinder walls that are bored—then honed. This quality workmanship guarantees the longest piston packing life. Ten sizes 1" to 12" bore—any stroke. Six basic mounting styles. Your best buy in cylinders. Send for bulletin.

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whether, for all the talk, the average American really believes that his prosperity is bound up with that of other peoples.

It can, of course, be argued that President Truman's speech was something more than an attempt to shock Congressmen out of their campaign to cut down military and relief expenditure. It may have been aimed over their heads at Stalin. It may have been part of a plan prepared by General Marshall, the strategist turned diplomat. If so, it may be the American intention to seek agreement with the Russians on a definition of vital interests, to clear up the half-understandings and ambiguous drafts of Yalta and Teheran. The speech then appears in a new light and this becomes the key sentence:

The world is not static and the *status quo* is not sacred, but we cannot allow changes in the *status quo* in violation of the United Nations Charter by such methods as coercion, or by such subterfuges as political infiltration.

This is language which the Russians will understand; it does not bring in that contentious word "democracy." It covers the world and not a particular part of it; it deals with power politics and not with political conceptions. It draws a line which the Russians are told they can cross only at grave risk.

Read with the offer of aid to Greece and Turkey, it seems to challenge any attempt to divide British and Americans. It points to the need for a general understanding—without which, indeed, it will be impossible either to plan American strategic and commercial policy or to educate the American people in the sacrifices which a resolute and effective world policy will demand.

If the speech means these things, the British reaction can be not nervous but confident. In this country, too, the planning of strategic and economic policies is impossible so long as it remains uncertain whether the Russians want a general long-term settlement, outside as well as within Germany. An Anglo-Soviet agreement alone, without an American-Soviet agreement, would have little value; for British interests are involved at every point where Russian and American interests clash.

But if there is to be nothing more than an American imitation of Soviet diplomatic tactics, an ex-

change of defiant gestures and ringing denunciations, we shall have to cross our fingers and build our shelters. A "tough line" clearly aiming at agreement with the Russians, and prepared, when the time comes, to meet them halfway, is something we can support; a "tough line" seeking to humiliate the Russians and destroy their society, in a fight in which we take the first blows, is, for any British government, a policy of despair.

The next American move will be watched for anxiously, not only in the Middle East, but also in Eastern Europe. Before this year is out the peace treaties with the satellite countries should come into force; and intervention in their internal affairs will become interference with the *status quo* to which Truman referred. Dollar diplomacy will invite a headlong collision with Communist policy unless General Marshall and Mr. Molotov can get on to terms of confidence. A permanent split across Europe between east and west could hardly be averted.

It is a clear British interest to support the eastward advance of American policy provided that two things are clearly understood: That loans of dollars and advisers, even visits of aircraft-carriers, do not automatically relieve Britain of alliances, loans and responsibilities already pledged; and that American diplomacy must have for its ultimate aim a firm understanding with the Soviet Government about vital interests within and outside Europe.

For better or for worse, we cannot deviate far from America's course. But it will be for better precisely in the degree in which America's policy is defined and resolute. and in which its aim and effect are the reconciliation of the powers and not the challenging of conflicts among them.

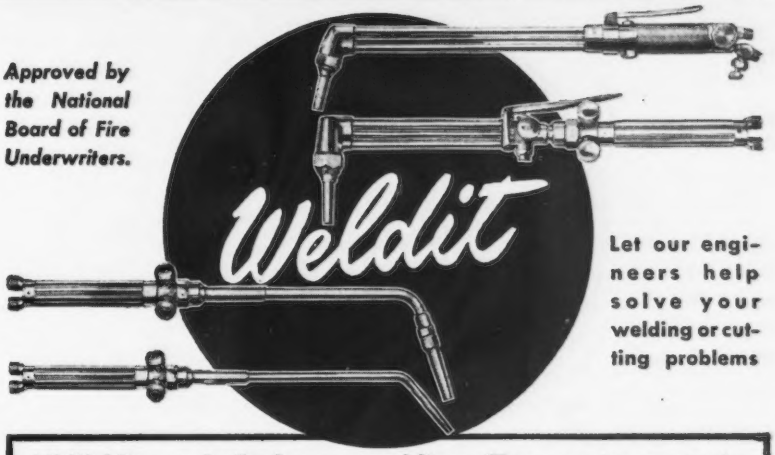
Brown & Sharpe Income Up

Providence, R. I.

• • • **Brown & Sharpe** Mfg. Co., Providence, for 1946 reports a net income of $2,461,844, equal to $17.76 a share on its 138,620 outstanding shares of stock. The net for 1945 was $1,337,166, or $9.65 a share.

At the annual meeting stockholders will be asked to split the stock five for one and reduce the par value from $50 a share to $10.

BUILT FOR ECONOMICAL OPERATION
And We Can Prove It!



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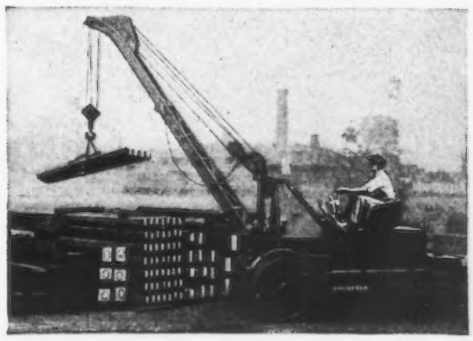
All Weldits are built along rugged lines. They are strong, sturdy, and long lasting. . . . Perfection in balance has been given special attention. . . . All parts subject to wear are easy to get at for replacement purposes. The result of 29 years of experience is built into every Weldit torch. . . . Thousands are in daily use in America's largest industrial plants—*They Must Be Good.*

Some distributor territory still available.

992 OAKMAN BLVD. **Weldit** INC. SINCE 1918 DETROIT 6, MICH.

8¢ per TON is Cost of Handling Steel Reported by This Plant

KRANE KAR is used by Kropp Forge, Chicago in the outdoors material storage yard for unloading and storage work and for moving bars and billets into the plant through low shop doors. Single billets up to about 15,000 pounds each are easily handled . . . Up to a quarter million pounds of steel are moved in an eight-hour day with ***KRANE KAR*** at an average eight-hour fuel consumption cost of about $1.50 . . . Extreme maneuverability is valuable for getting in and out between closely piled stacks of steel bars and billets. As a portion of the yard does not have a cement floor, the pneumatic tires provide ideal traction. This unit finds additional use in unloading and handling heavy forging hammer repair parts, loaded tote boxes, and other miscellaneous heavy materials handling work. — *Transcribed from a letter from Kropp Forge.*



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2½, 5, AND 10 TON CAPACITIES

KRANE KAR
TRADE MARK REGISTERED

SILENT HOIST & CRANE CO., 851 63rd ST., B'KLYN 20, N.Y.

An Economic Approach to Hardenability

(CONTINUED FROM PAGE 55)

practically every popular AISI standard chemistry steel except the Amola type. The *H* band *DI* for certain martensite structures will also be available in published form when the new ASM Handbook becomes available later in the year.

In the light of increased cost in all materials, labor and overhead going into a product, it is apparent that closer scrutiny of steels will be made in the hope that cost can be held down without sacrificing quality or usefulness to the product. It is further evident that alloy steels are a good starting point, not only because they are somewhat expensive, but also because *DI*, if correctly applied, offers an excellent standard index or comparator in any application where hardenability is of prime concern.

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6' 9" TRAVEL
GUARD EMPLOYEE HEALTH by installing Ruemelin Fume Collectors wherever welding operations take place. They remove noxious gases, heat and smoke at the source . . . eliminate employee fatigue . . . speed up welding operations. Especially valuable in winter when doors and windows must be closed. Hundreds in operation all over the country. Write for bulletin No. 37-C.
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SAND BLAST AND DUST COLLECTING EQUIPMENT
RUEMELIN FUME COLLECTOR
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Gallup Polls

(CONTINUED FROM PAGE 109)

anything but the barest necessities for a while."

One in ten who had heard or read of the report were undecided about it.

Washington dispatches early this week indicated that the Army is already preparing to meet Mr. Hoover's recommendations. Supplies for soup kitchen feeding were reported to be arriving in Germany, and seeds to help rehabilitate German agriculture are ready for shipment.

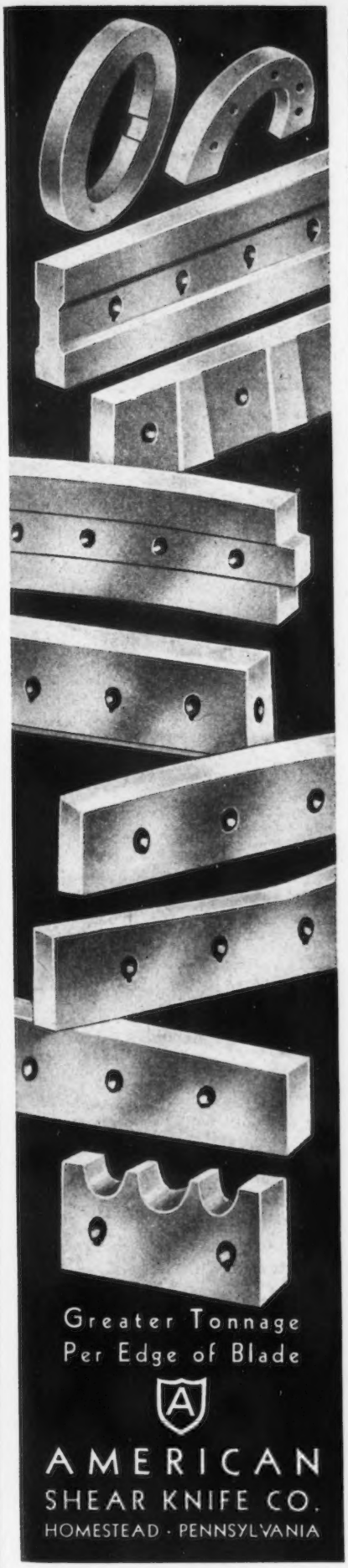
Pig Iron Production In Canada Reaches New High in January

Toronto

• • • **Canadian pig** iron production made a new all time high monthly record in January, totaling 177,313 net tons or 76.7 pct of total rated capacity, which compares with 161,464 tons or 69.9 pct in December and 143,685 tons in January 1946. The month's output included 136,495 tons of basic iron, of which 130,876 tons were for further use of producing companies and 5619 tons for sale; 27,433 tons of foundry iron, 196 tons for further use and 27,237 tons for sale, and 13,385 tons of malleable iron, all for sale.

Charges to blast furnaces in January included 330,684 tons of iron ore, 18,469 tons of mill cinder, scale, sinter, etc., and 5156 tons of scrap iron and steel. Throughout the month, 10 out of a total of 14 blast furnaces were blowing. Canada's total pig iron capacity is 2,770,760 net tons a year, with furnaces located as follows: Algoma Steel Corp., Sault Ste. Marie, Ont., 5 furnaces, total capacity 1,062,000 tons a year; The Steel Co. of Canada, Ltd., 3 furnaces, capacity 757,000 tons; Canadian Furnace Co., Ltd., Port Colborne, Ont., 2 furnaces, capacity 221,760 tons; Dominion Steel & Coal Corp., Ltd., Sydney, N. S., 4 furnaces, capacity 730,000 tons. The above do not include one small electric furnace located in British Columbia.

Production of ferroalloys in January totaled 9644 net tons, compared with 11,766 tons in December and 10,878 tons in January 1946.



American Rolling Mill Reports Earnings In 1946 Of $18,552,491

Middletown, Ohio

• • • **American Rolling** Mill Co. and subsidiaries report earnings for 1946 of $18,552,491 after taxes, equal to $5.35 a common share. In 1945 the company earned $13,392,196 after taxes and including extraordinary and nonrecurring adjustments, equal to $3.96 a common share.

Armco's net sales for 1946 were $231,930,811, compared with $220,144,648 in 1945. The increase of approximately $12 million in net sales was largely due to the greater proportion of specialty products sold.

Gross profit margin was improved to the extent of approximately $4 million in 1946 over 1945, due to taking depreciation on facilities built during the war at normal rate rather than at the allowed accelerated rate of 20 pct which prevailed in 1945.

The company spent $16,170,428 during 1946 to modernize and improve its facilities, C. R. Hook, president, stated. But despite the large expenditure for capital improvements, Armco's working capital increased from $79,854,505 (revised) in 1945 to $82,577,790 at the end of 1946, an increase of $2,723,285. Total payroll for the year was $74,896,811.

"The steel industry should operate at full capacity through 1947, provided there is no recurrence of costly strikes, wages and prices are kept in balance and raw materials are available," Mr. Hook predicted.

Drops Escalator Clause

Cleveland

• • • **Another company** name is added to the list of those which have discontinued escalator clauses in order acceptances. The Reliable Spring & Wire Forms Co., Cleveland, announces that such clauses will no longer be included in its acceptance of orders for springs, wire forms and light stampings. The company also states that due to new production economies it has been able to refrain from a general price increase and expects to be able to maintain this policy.

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